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Tian, Li
Kim, Joonyul

<120> Novel Carotenoid Hydroxylases for Use in Engineering Carotenoid Metabolism in Plants

<130> MSU-08604

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<141> 2004-01-02

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<170> PatentIn version 3.2

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Arg Glu Glu Gly Pro Val Tyr Arg Leu Ala Ala Gly Pro Arg Asp Leu
        115                 120                 125

Val Val Val Ser Asp Pro Ala Val Ala Arg His Val Leu Arg Gly Tyr
    130                 135                 140

Gly Ser Arg Tyr Glu Lys Gly Leu Val Ala Glu Val Ser Glu Phe Leu
145                 150                 155                 160

Phe Gly Ser Gly Phe Ala Ile Ala Glu Gly Ala Leu Trp Thr Val Arg
                165                 170                 175

Arg Arg Ser Val Val Pro Ser Leu His Lys Arg Phe Leu Ser Val Met
            180                 185                 190

Val Asp Arg Val Phe Cys Lys Cys Ala Glu Arg Leu Val Glu Lys Leu
        195                 200                 205

Glu Thr Ser Ala Leu Ser Gly Lys Pro Val Asn Met Glu Ala Arg Phe
    210                 215                 220

Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr Asn
225                 230                 235                 240

Phe Asp Ser Leu Thr Ser Asp Ser Pro Val Ile Asp Ala Val Tyr Thr
                245                 250                 255

Ala Leu Lys Glu Ala Glu Leu Arg Ser Thr Asp Leu Leu Pro Tyr Trp
            260                 265                 270

Lys Ile Asp Leu Leu Cys Lys Ile Val Pro Arg Gln Ile Lys Ala Glu
        275                 280                 285

Lys Ala Val Asn Ile Ile Arg Asn Thr Val Glu Asp Leu Ile Thr Lys
    290                 295                 300
```

Cys Lys Lys Ile Val Asp Ala Glu Asn Glu Gln Ile Glu Gly Glu Glu
305 310 315 320

Tyr Val Asn Glu Ala Asp Pro Ser Ile Leu Arg Phe Leu Leu Ala Ser
325 330 335

Arg Glu Glu Val Thr Ser Val Gln Leu Arg Asp Asp Leu Leu Ser Met
340 345 350

Leu Val Ala Gly His Glu Thr Thr Gly Ser Val Leu Thr Trp Thr Ile
355 360 365

Tyr Leu Leu Ser Lys Asp Pro Ala Ala Leu Arg Arg Ala Gln Ala Glu
370 375 380

Val Asp Arg Val Leu Gln Gly Arg Leu Pro Arg Tyr Glu Asp Leu Lys
385 390 395 400

Glu Leu Lys Tyr Leu Met Arg Cys Ile Asn Glu Ser Met Arg Leu Tyr
405 410 415

Pro His Pro Pro Val Leu Ile Arg Arg Ala Ile Val Asp Asp Val Leu
420 425 430

Pro Gly Asn Tyr Lys Ile Lys Ala Gly Gln Asp Ile Met Ile Ser Val
435 440 445

Tyr Asn Ile His Arg Ser Pro Glu Val Trp Asp Arg Ala Asp Asp Phe
450 455 460

Ile Pro Glu Arg Phe Asp Leu Glu Gly Pro Val Pro Asn Glu Thr Asn
465 470 475 480

Thr Glu Tyr Arg Phe Ile Pro Phe Ser Gly Gly Pro Arg Lys Cys Val
485 490 495

Gly Asp Gln Phe Ala Leu Leu Glu Ala Ile Val Ala Leu Ala Val Val
500 505 510

Leu Gln Lys Met Asp Ile Glu Leu Val Pro Asp Gln Lys Ile Asn Met
515 520 525

```
Thr Thr Gly Ala Thr Ile His Thr Thr Asn Gly Leu Tyr Met Asn Val
    530                 535                 540

Ser Leu Arg Lys Val Asp Arg Glu Pro Asp Phe Ala Leu Ser Gly Ser
545                 550                 555                 560

Arg
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<210> 17
<211> 545
<212> PRT
<213> Hordeum vulgare

<220>
<221> misc_feature
<222> (529)..(529)
<223> Xaa can be any naturally occurring amino acid

<400> 17

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Met Pro Ala Ala Ala Phe Ala Ser Ala Leu Ala Ser Pro Pro Pro Pro
1               5                   10                  15

Trp Ala Pro Arg Pro Ser Pro Arg His Ala Ser Leu Arg Leu Pro Pro
            20                  25                  30

Pro Arg Ser Ser Gly Gly Gly Gly Asp Lys Pro Thr Thr Ser Trp Val
        35                  40                  45

Ser Pro Asp Trp Leu Thr Ser Leu Ser Arg Ser Val Leu Gly Arg Gly
    50                  55                  60

Asn Asp Asp Ser Gly Ile Pro Val Ala Ser Ala Lys Leu Asp Asp Val
65                  70                  75                  80

Gln Asp Leu Leu Gly Gly Ala Leu Phe Leu Pro Leu Phe Lys Trp Phe
                85                  90                  95

Arg Glu Glu Gly Pro Val Tyr Arg Leu Ala Ala Gly Pro Arg Asp Phe
            100                 105                 110

Val Ile Val Ser Asp Pro Ala Val Ala Lys His Val Leu Arg Gly Tyr
        115                 120                 125

Gly Thr Arg Tyr Glu Lys Gly Leu Val Ala Glu Val Ser Glu Phe Leu
    130                 135                 140
```

```
Phe Gly Ser Gly Phe Ala Ile Ala Glu Gly Ala Leu Trp Thr Val Arg
145                 150                 155                 160

Arg Arg Ala Val Val Pro Ser Leu His Lys Arg Phe Leu Ser Val Met
                165                 170                 175

Val Asp Lys Val Phe Cys Lys Cys Ala Glu Arg Leu Val Glu Lys Leu
            180                 185                 190

Glu Thr Tyr Ala Leu Ser Gly Glu Pro Val Asn Met Glu Ala Arg Phe
        195                 200                 205

Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr Asn
    210                 215                 220

Phe Asp Ser Leu Thr Ser Asp Ser Pro Val Ile Asp Ala Val Tyr Thr
225                 230                 235                 240

Ala Leu Lys Glu Ala Glu Ala Arg Ser Thr Asp Leu Leu Pro Tyr Trp
                245                 250                 255

Gln Ile Asp Leu Leu Cys Lys Ile Val Pro Arg Gln Ile Lys Ala Glu
            260                 265                 270

Lys Ala Val Asn Thr Ile Arg Asn Thr Val Glu Glu Leu Ile Ile Lys
        275                 280                 285

Cys Lys Ala Ile Val Asp Ala Glu Asn Glu Gln Ile Glu Gly Glu Glu
    290                 295                 300

Tyr Val Asn Glu Ala Asp Pro Ser Ile Leu Arg Phe Leu Leu Ala Ser
305                 310                 315                 320

Arg Glu Glu Val Ser Ser Leu Gln Leu Arg Asp Asp Leu Leu Ser Met
                325                 330                 335

Leu Val Ala Gly His Glu Thr Thr Gly Ser Val Leu Thr Trp Thr Ile
            340                 345                 350

Tyr Leu Leu Ser Lys Asp Pro Val Ala Leu Arg Arg Ala Gln Asp Glu
        355                 360                 365

Val Asp Arg Val Leu Gln Gly Arg Leu Pro Arg Tyr Glu Asp Val Lys
    370                 375                 380

Glu Leu Lys Tyr Leu Met Arg Cys Ile Asn Glu Ser Met Arg Leu Tyr
385                 390                 395                 400
```

Pro His Pro Pro Val Leu Ile Arg Arg Ala Leu Val Asp Asp Val Leu
405 410 415

Pro Gly Asn Tyr Lys Val Lys Thr Gly Gln Asp Ile Met Ile Ser Val
420 425 430

Tyr Asn Ile His Arg Ser Pro Glu Val Trp Asp Arg Ala Asp Glu Phe
435 440 445

Ile Pro Glu Arg Phe Asp Leu Glu Gly Pro Ile Pro Asn Glu Ser Asn
450 455 460

Thr Asp Phe Arg Phe Ile Pro Phe Ser Gly Gly Pro Arg Lys Cys Val
465 470 475 480

Gly Asp Gln Phe Ala Leu Leu Glu Ala Ile Val Ala Leu Ala Ile Val
485 490 495

Ile Gln Lys Met Asp Val Gln Leu Val Ala Asp Gln Lys Ile Ser Met
500 505 510

Thr Thr Gly Ala Thr Ile His Thr Thr Asn Gly Leu Tyr Met Asn Val
515 520 525

Xaa Leu Arg Lys Val Glu Gln Glu Ala Asp Leu Ala Leu Ser Pro Ser
530 535 540

Gly
545

<210> 18
<211> 362
<212> PRT
<213> Triticum aestivum

<400> 18

Met Pro Ala Ala Ala Phe Ala Ser Ala Phe Ala Ser Pro Pro Pro Pro
1 5 10 15

Trp Ala Pro Arg Pro Pro Pro Arg His Ala Ser Leu Arg Leu Pro Pro
20 25 30

Pro Arg Ser Ser Ser Asn Asn Ser Gly Gly Gly Gly Gly Asp Lys Pro
35 40 45

Thr Thr Ser Trp Val Ser Pro Asp Trp Leu Thr Ser Leu Ser Arg Ser
50 55 60

Val Leu Gly Arg Gly Asn Asp Asp Ser Gly Ile Pro Val Ala Ser Ala
65 70 75 80

Lys Leu Asp Asp Val Gln Asp Leu Leu Gly Gly Ala Leu Phe Leu Pro
85 90 95

Leu Phe Lys Trp Phe Arg Glu Glu Gly Pro Val Tyr Arg Leu Ala Ala
100 105 110

Gly Pro Arg Asp Phe Val Ile Val Ser Asp Pro Ala Val Ala Lys His
115 120 125

Val Leu Arg Gly Tyr Gly Thr Arg Tyr Glu Lys Gly Leu Val Ala Glu
130 135 140

Val Ser Glu Phe Leu Phe Gly Ser Gly Phe Ala Ile Ala Glu Gly Ala
145 150 155 160

Leu Trp Thr Val Arg Arg Arg Ala Val Val Pro Ser Leu His Lys Arg
165 170 175

Phe Leu Ser Val Met Val Asp Lys Val Phe Cys Lys Cys Ala Glu Arg
180 185 190

Leu Val Glu Lys Leu Glu Thr Tyr Ala Leu Ser Gly Glu Pro Val Asn
195 200 205

Met Glu Ala Arg Phe Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser
210 215 220

Leu Phe Asn Tyr Asn Phe Asp Ser Leu Thr Ser Asp Ser Pro Val Ile
225 230 235 240

Asp Ala Val Tyr Thr Ala Leu Lys Glu Ala Glu Ala Arg Ser Thr Asp
245 250 255

Leu Leu Pro Tyr Trp Gln Ile Asp Leu Leu Cys Lys Ile Val Pro Arg
260 265 270

Gln Ile Lys Ala Glu Lys Ala Val Asn Thr Ile Arg Asn Thr Val Glu
275 280 285

Glu Leu Ile Thr Lys Cys Lys Ala Ile Val Asp Ala Glu Asn Glu Gln
290 295 300

```
Ile Glu Gly Glu Glu Tyr Val Asn Glu Ala Asp Pro Ser Ile Leu Arg
305                 310                 315                 320

Phe Leu Leu Ala Ser Arg Glu Glu Val Ser Ser Leu Gln Leu Arg Asp
                325                 330                 335

Asp Leu Leu Ser Met Leu Val Ala Gly His Glu Thr Thr Gly Ser Val
            340                 345                 350

Pro Asp Tyr Arg Leu Gln Ala Gln Gly Ser
        355                 360
```

<210> 19
<211> 279
<212> PRT
<213> Lycopersicon esculentum

<400> 19

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Cys Arg Cys Ala Glu Arg Met Val Glu Lys Leu Leu Pro Asp Ala Ile
1               5                   10                  15

Ser Gly Ser Ala Val Asn Met Glu Ala Lys Phe Ser Gln Leu Thr Leu
            20                  25                  30

Asp Val Ile Gly Leu Ala Leu Phe Asn Tyr Asn Phe Asp Ser Leu Thr
        35                  40                  45

Thr Asp Ser Pro Val Ile Asp Ala Val Tyr Thr Ala Leu Lys Glu Ala
    50                  55                  60

Glu Leu Arg Ser Thr Asp Leu Leu Pro Tyr Trp Gln Ile Lys Ala Leu
65                  70                  75                  80

Cys Lys Phe Ile Pro Arg Gln Ile Lys Ala Glu Asn Ala Val Ser Leu
                85                  90                  95

Ile Arg Gln Thr Val Glu Glu Leu Ile Ala Lys Cys Arg Glu Ile Val
            100                 105                 110

Glu Thr Glu Gly Glu Arg Ile Asn Glu Asp Glu Tyr Val Asn Asp Arg
        115                 120                 125

Asp Pro Ser Ile Leu Arg Phe Leu Leu Ala Ser Arg Glu Glu Val Ser
    130                 135                 140

Ser Leu Gln Leu Arg Asp Asp Leu Leu Ser Met Leu Val Ala Gly His
145                 150                 155                 160
```

```
Glu Thr Thr Gly Ser Val Leu Thr Trp Thr Ala Tyr Leu Leu Ser Lys
                165                 170                 175

Asp Pro Ser Ser Leu Glu Lys Ala His Glu Glu Val Asp Arg Val Leu
            180                 185                 190

Gly Gly Arg Ser Pro Thr Tyr Glu Asp Met Lys Asn Leu Lys Phe Leu
        195                 200                 205

Thr Arg Cys Ile Thr Glu Ser Leu Arg Leu Tyr Pro His Pro Pro Val
    210                 215                 220

Leu Ile Arg Arg Ala Gln Val Ala Asp Val Leu Pro Gly Asn Tyr Lys
225                 230                 235                 240

Val Asn Val Gly Gln Asp Ile Met Ile Ser Val Tyr Asn Ile His His
                245                 250                 255

Ser Ser Lys Val Trp Asp Arg Ala Glu Glu Phe Asp Pro Glu Arg Phe
            260                 265                 270

Asp Leu Glu Arg Ser Arg Pro
        275
```

<210> 20
<211> 177
<212> PRT
<213> Zea mays

<400> 20

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Leu Glu Pro Tyr Ala Leu Ser Gly Glu Pro Val Asn Met Glu Ala Arg
1               5                   10                  15

Phe Ser Gln Leu Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr
            20                  25                  30

Asn Phe Asp Ser Leu Thr Thr Asp Ser Pro Val Ile Asp Ala Val Tyr
        35                  40                  45

Thr Ala Leu Lys Glu Ala Glu Leu Arg Ser Thr Asp Leu Leu Pro Tyr
    50                  55                  60

Trp Lys Val Gly Phe Leu Cys Lys Ile Ile Pro Arg Gln Ile Lys Ala
65                  70                  75                  80

Glu Asn Ala Val Thr Ile Ile Arg Asn Thr Val Glu Glu Leu Ile Met
                85                  90                  95
```

```
Lys Cys Lys Glu Ile Val Glu Ala Glu Asn Glu Gln Ile Glu Gly Glu
            100                 105                 110

Glu Tyr Val Asn Glu Gly Asp Pro Ser Ile Leu Arg Phe Leu Leu Ala
        115                 120                 125

Ser Arg Asp Glu Val Ser Ser Val Gln Leu Arg Asp Asp Leu Leu Ser
    130                 135                 140

Met Leu Val Ala Gly His Glu Thr Thr Gly Ser Val Leu Thr Trp Thr
145                 150                 155                 160

Ile Tyr Leu Leu Ser Lys Asp Pro Thr Ala Leu Arg Arg Ala Gln Asp
                165                 170                 175

Glu
```

<210> 21
<211> 208
<212> PRT
<213> Helianthus annuus

<400> 21

```
Gly Pro Arg Asn Phe Val Ile Val Ser Asp Pro Glu Ile Ala Lys His
1               5                   10                  15

Val Leu Arg Asn Tyr Gly Ser Ile Tyr Ala Lys Gly Leu Val Ala Glu
            20                  25                  30

Val Ser Glu Phe Leu Phe Gly Ser Gly Phe Ala Ile Ala Glu Gly Ser
        35                  40                  45

Leu Trp Thr Ala Arg Arg Arg Ala Val Val Pro Ser Leu His Lys Lys
    50                  55                  60

Tyr Leu Ser Val Ile Val Asp Arg Val Phe Cys Lys Cys Ser Glu Arg
65                  70                  75                  80

Leu Val Glu Lys Leu Arg Ser Tyr Ala Arg Ser Asp Thr Ser Val Asn
                85                  90                  95

Met Glu Gln Gln Phe Ser Gln Leu Thr Leu Asp Val Ile Gly Leu Ala
            100                 105                 110

Val Phe Asn Tyr Asn Phe Asp Ser Leu Thr Ala Asp Ser Pro Val Ile
        115                 120                 125
```

```
Glu Ser Val Tyr Thr Ala Leu Lys Glu Ala Glu Ala Arg Ser Thr Asp
    130                 135                 140

Leu Leu Pro Tyr Trp Lys Ile Ser Ala Leu Cys Lys Ile Ile Pro Arg
145                 150                 155                 160

Gln Ile Lys Ala Glu Gln Ala Val Thr Val Ile Arg Glu Thr Val Glu
                165                 170                 175

Glu Leu Ile Ile Lys Cys Lys Glu Ile Val Glu Lys Glu Gly Glu Lys
            180                 185                 190

Ile Asp Asp Glu Asp Tyr Val Asn Asp Ala Thr Tyr Ile Phe Ile Cys
        195                 200                 205
```

<210> 22
<211> 1686
<212> DNA
<213> Oryza sativa

<400> 22

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atggccgccg ccgccgccgc cgccgtcccg tgcgtaccat tcctgtgccc gcctcctccg     60

ccattggtct cgccgcgtct ccgccgtggc cacgtccgcc tccgcctgcg gccgccaagg    120

agcagcggcg gtggaggcgg aggcggagcg gggggagacg agccgcccat caccacctcg    180

tgggtgagcc ccgactggct cacggcgctc tcccgctcgg tggcaacccg cctcggcggg    240

ggcgacgact cggggatccc cgtcgcctcc gccaagctcg acgacgtgcg ggacctcctc    300

ggcggcgcgc tcttcctccc tctcttcaag tggttccgcg aggaaggccc cgtctaccgc    360

ctcgcggcgg ggccgcggga tctcgtcgtc gtcagcgatc ccgccgttgc caggcacgtg    420

ctgcgtgggt acggttcgag gtacgagaag gggctcgtcg ccgaggtttc cgagttcctc    480

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gtaccatctc tacacaaacg atttctctcg gtgatggttg acagagtttt ttgtaaatgt    600

gctgagagat tagtggagaa gcttgagaca tctgctttaa gtggcaaacc tgtaaatatg    660

gaagcaaggt tctctcaaat gactttagat gtgattggtt tgtccttgtt caattacaat    720

tttgattccc tcacatcaga tagccctgtt attgatgctg tttacactgc actcaaggaa    780

gcagaacttc gttctacaga tcttttacca tactggaaga ttgatttgct gtgcaagatt    840

gttcctagac aaataaaagc agaaaaggca gttaacatca tcaggaatac cgttgaggac    900

ctaattacca aatgcaagaa gattgtagat gctgagaatg aacaaattga gggtgaggaa    960

tatgtaaatg aggcagaccc tagcatcctg cgattcctac ttgctagccg tgaagaggta   1020

accagtgtgc agttacgtga tgatctattg tcaatgttag ttgctggtca tgaaacaaca   1080
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ggctctgtac tgacgtggac tatttatctt ctcagtaagg atccagcagc gctgaggaga 1140

gctcaagcag aggttgaccg tgttctacaa ggtagactcc ccagatatga agatctaaaa 1200

gagctgaagt acttgatgcg ctgtataaat gagtctatgc ggctttatcc acacccacct 1260

gtgttgatac ggcgagccat agttgatgat gtgcttcccg gaaactataa gatcaaagct 1320

ggtcaagata ttatgatttc agtgtacaat atacacaggt cacctgaggt ttgggacaga 1380

gctgatgatt ttattcctga gagatttgat ttagagggac ctgttccaaa tgagacaaac 1440

actgaataca gatttatccc attcagtgga ggtcctcgga aatgtgttgg agatcagttt 1500

gctctcttgg aagcaattgt ggcacttgct gttgtgttgc agaagatgga cattgagctt 1560

gtgccagatc aaaaaattaa catgactact ggggccacaa ttcatacaac caatggcctg 1620

tatatgaatg taagtctgcg taaagttgac agggaacctg attttgcact cagtgggtcc 1680

agatga 1686

<210> 23
<211> 1638
<212> DNA
<213> Hordeum vulgare

<220>
<221> misc_feature
<222> (1587)..(1587)
<223> n is a, c, g, or t

<400> 23
atgcccgccg cggcattcgc ctccgcgctc gcgtctcctc ctcctccatg ggccccacga 60

ccgtcccctc ggcacgctag cctccgcctg cccccgccaa ggagcagcgg cggcggaggg 120

gacaagccca ccacgtcgtg ggtcagcccc gactggctca cgtcgctgtc ccgctcggtg 180

ctcggccggg gaaacgacga ctcggggatc cccgtcgcct ccgccaagct cgacgacgtg 240

caggacctcc tcgggggcgc gctcttcctc ccgctcttca agtggttccg cgaggaaggg 300

cccgtctacc gcctcgccgc ggggccgcgc gacttcgtca tcgtcagcga ccccgccgtg 360

gccaagcacg tcctccgcgg gtacggcacg cggtacgaga aggggctcgt cgccgaggtc 420

tccgagttcc tctttggctc tgggttcgcc atcgccgagg gagcgctctg gacggtgaga 480

cgtagagcag ttgtaccatc tctacacaaa agatttctct cagtaatggt tgataaagtg 540

ttttgtaaat gtgctgagag attggtggaa aagctcgaga catatgcttt gagcggtgaa 600

cctgttaata tggaagcgag attttctcaa atgacactag atgtgattgg tttgtctttg 660

ttcaactaca actttgattc cctcacatca gatagtcctg ttattgatgc tgtttacacc 720

gcactgaaag aagcagaggc tcgttctaca gatcttttac catactggca gattgatttg 780

ctgtgcaaga ttgttcctag acagatcaaa gcagaaaagg cagttaacac aataaggaat 840

actgttgaag agctaattat aaaatgcaag gcaatcgtag atgctgaaaa tgaacagatt 900

gagggtgaag aatatgtaaa tgaggcagat cctagcatcc tgcgtttttt acttgctagc 960

cgtgaagagg tcagcagttt gcagttacgt gatgatctat tgtcaatgtt agttgctggt 1020

cacgaaacaa caggctctgt actgacatgg actatttatc ttctcagtaa ggatccagta 1080

gcactaagga gagcccaaga tgaggtagat cgtgttctac aaggtagact cccaagatat 1140

gaagatgtaa aagagctgaa gtacttgatg cgctgtatca atgagtccat gcggctatac 1200

ccacatcctc ctgtgctgat acggcgtgca ctagttgatg atgtgcttcc tggaaactac 1260

aaggttaaga ctggtcaaga tattatgatt tctgtgtaca atattcacag atcacctgag 1320

gtatgggaca gagcagatga attcattcca gagagatttg atttggaggg tcccattcca 1380

aatgagtcaa acaccgattt caggtttatc cctttcagtg gaggtcctcg aaaatgtgtt 1440

ggagatcagt ttgctctttt agaagcaatt gtggcacttg caattgtcat acaaaagatg 1500

gacgttcagc ttgtggcaga tcaaaaaatc agcatgacca ctggggccac catccataca 1560

accaatggac tgtacatgaa tgtaagnctg cgtaaagttg agcaagaagc tgacttagca 1620

ctgagtccat caggctag 1638

<210> 24
<211> 1086
<212> DNA
<213> Triticum aestivum

<400> 24
atgcccgccg cggcattcgc ctccgcgttc gcgtctcctc ctcctccgtg ggccccacga 60

ccgcctcctc gccacgccag cctccgcctg cccccgccaa ggagcagcag caacaacagc 120

ggcggcggcg gaggggacaa gcccaccacc tcgtgggtca gccccgactg gctgacgtcg 180

ctgtctcgct cggtgctcgg ccgggggaac gacgactcgg ggatacccgt cgcctccgcc 240

aagctcgacg acgtgcagga cctcctcggg ggcgcgctct tcctgccgct cttcaagtgg 300

ttccgcgagg aagggcccgt ctaccgcctc gccgcggggc cgcgcgactt cgtcatcgtc 360

agcgaccccg ccgtagccaa gcacgtcctc cgcgggtacg gcacgcggta cgagaagggg 420

ctcgtcgccg aggtctccga gttcctcttt ggctctgggt tcgccatcgc cgagggagcg 480

ctctggacgg tgagacgtag agcagttgta ccatctctac acaaaagatt tctctcagta 540

atggtcgata aagtgttctg taaatgtgct gagagattgg tggaaaagct cgagacttat 600

gctttgagtg gtgaacctgt taatatggaa gcgaggtttt ctcaaatgac attagatgtg 660

attggtttat ccttgttcaa ctacaacttt gattccctca catcagatag tcctgttatt 720

gatgctgttt acactgcact caaagaagct gaggctcgtt ctacagatct tttaccatac 780

tggcagatcg atttgctgtg caagattgtt cctagacaga taaaagcgga aaaagcagtt 840

aacacaataa ggaataccgt tgaagagcta attacaaaat gcaaggcaat cgtagatgct 900

gaaaatgaac agattgaggg tgaagaatat gtaaatgagg cagatcctag catcctgcgg 960

tttttacttg ctagccgtga agaggtcagc agtttgcagt tacgtgatga tctattgtca 1020

atgttagttg ctggtcatga aacaacaggt tctgtaccag actatcgatt acaagcccaa 1080

ggttcc 1086

<210> 25
<211> 839
<212> DNA
<213> Lycopersicon esculentum

<400> 25
tgcagatgtg ctgagagaat ggtggagaaa cttttacctg atgcaatttc tggctctgca 60

gtgaatatgg aggcaaagtt ttctcaacta acacttgatg ttattggcct tgcactcttc 120

aattacaatt ttgattccct tactactgac agtccagtta ttgatgcagt ttacactgca 180

ctaaaagaag cagaactccg ttcaactgat ttgttgccat attggcagat caaagcttta 240

tgtaagttca tcccacgaca aataaaggct gagaatgcag tgtcattaat cagacaaaca 300

gttgaagaac ttattgcgaa gtgcagagag attgtagaaa ctgagggtga gaggattaat 360

gaagatgagt acgtgaatga tagagatcca agcatccttc gatttttgct tgctagccgt 420

gaggaggttt caagtttaca acttcgagat gatcttctgt caatgctagt tgctgggcat 480

gaaaccacag gttcagtttt gacttggacg gcatacctgc tgagtaagga cccttcctct 540

ttggaaaaag cacatgagga agtagacaga gttttgggag gacgctctcc gacttatgaa 600

gatatgaaga atctcaagtt cttaacacgg tgcataactg agtcactcag actctatcca 660

catccacctg tcctgataag acgagctcaa gtagctgatg tcctccccgg gaattacaaa 720

gtcaatgttg gtcaggatat aatgatttcg gtatataaca ttcatcattc ttcaaaagta 780

tgggatagag ctgaagaatt tgatcctgaa agattcgact tggaaaggtc ccgtcccaa 839

<210> 26
<211> 531
<212> DNA
<213> Zea mays

<400> 26
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acattggatg tgattggttt atcattgttc aactacaatt ttgattccct cacaacagat 120

agtcctgtca ttgatgctgt ttatactgca ctcaaagaag cagagcttcg ttctacagat 180

cttttgccat actggaaggt tggtttcttg tgcaagataa tcccaagaca gataaaagca 240

gagaatgcgg ttacgattat aaggaacact gttgaagagc tgattatgaa gtgtaaagaa 300

atagtggaag ctgaaaatga acagattgag ggtgaggaat atgtaaacga aggggatcct 360

agcattctac gcttcctact tgctagccga gatgaggtaa gcagtgtaca attacgtgat 420

gatctcttgt caatgttagt tgctggtcat gaaacaacag gctctgtact gacgtggaca 480

atctatcttc tcagtaagga tccgactgca ctgaggagag ctcaagatga a 531

<210> 27
<211> 624
<212> DNA
<213> Helianthus annuus

<400> 27
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tatgggagta tttatgctaa aggccttgtt gctgaggtct ctgagttctt gtttggttct 120

ggttttgcca ttgctgaagg ctctctttgg actgcaaggc gcagggctgt agttccatca 180

cttcacaaga agtacttatc agtaatagtt gatcgtgtat tttgcaaatg ctccgagagg 240

cttgtcgaaa agctaagatc atacgcacgc agtgacacgt ctgttaacat ggagcaacag 300

ttttcgcagt taacccttga tgttatcggt ctagccgtat ttaactacaa ttttgactca 360

cttacggccg atagtcctgt aattgaatct gtttataccg cactaaaaga agctgaagcc 420

cgttcaactg atcttttgcc atattggaag ataagtgcgt tatgtaagat tataccaaga 480

caaataaaag ccgagcaagc agttactgta attagagaaa ctgtcgaaga acttattata 540

aaatgcaagg aaatcgttga aaaggaaggt gaaaaaatag acgatgaaga ttacgtaaat 600

gatgcaacct atatcttcat ctgc 624

<210> 28
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 28
cttcctcttc ttactcttct ctcttcact 29

<210> 29
<211> 29
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 29
aagaacgatg gatgttatag actgaaatc 29

<210> 30
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 30
ccgtctcgct gctggtcctc g 21

<210> 31
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 31
ggatgaatga gtacggaccc at 22

<210> 32
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 32
gggtcgctca caattacgaa a 21

<210> 33
<211> 595
<212> PRT
<213> Arabidopsis thaliana

<400> 33

Met Ala Met Ala Phe Pro Leu Ser Tyr Thr Pro Thr Ile Thr Val Lys
1 5 10 15

Pro Val Thr Tyr Ser Arg Arg Ser Asn Phe Val Val Phe Ser Ser Ser
20 25 30

Ser Asn Gly Arg Asp Pro Leu Glu Glu Asn Ser Val Pro Asn Gly Val
35 40 45

Lys Ser Leu Glu Lys Leu Gln Glu Glu Lys Arg Arg Ala Glu Leu Ser
50 55 60

Ala Arg Ile Ala Ser Gly Ala Phe Thr Val Arg Lys Ser Ser Phe Pro
65 70 75 80

```
Ser Thr Val Lys Asn Gly Leu Ser Lys Ile Gly Ile Pro Ser Asn Val
                85                  90                  95

Leu Asp Phe Met Phe Asp Trp Thr Gly Ser Asp Gln Asp Tyr Pro Lys
            100                 105                 110

Val Pro Glu Ala Lys Gly Ser Ile Gln Ala Val Arg Asn Glu Ala Phe
        115                 120                 125

Phe Ile Pro Leu Tyr Glu Leu Phe Leu Thr Tyr Gly Gly Ile Phe Arg
    130                 135                 140

Leu Thr Phe Gly Pro Lys Ser Phe Leu Ile Val Ser Asp Pro Ser Ile
145                 150                 155                 160

Ala Lys His Ile Leu Lys Asp Asn Ala Lys Ala Tyr Ser Lys Gly Ile
                165                 170                 175

Leu Ala Glu Ile Leu Asp Phe Val Met Gly Lys Gly Leu Ile Pro Ala
            180                 185                 190

Asp Gly Glu Ile Trp Arg Arg Arg Arg Ala Ile Val Pro Ala Leu
        195                 200                 205

His Gln Lys Tyr Val Ala Ala Met Ile Ser Leu Phe Gly Glu Ala Ser
    210                 215                 220

Asp Arg Leu Cys Gln Lys Leu Asp Ala Ala Ala Leu Lys Gly Glu Glu
225                 230                 235                 240

Val Glu Met Glu Ser Leu Phe Ser Arg Leu Thr Leu Asp Ile Ile Gly
                245                 250                 255

Lys Ala Val Phe Asn Tyr Asp Phe Asp Ser Leu Thr Asn Asp Thr Gly
            260                 265                 270

Val Ile Glu Ala Val Tyr Thr Val Leu Arg Glu Ala Glu Asp Arg Ser
        275                 280                 285

Val Ser Pro Ile Pro Val Trp Asp Ile Pro Ile Trp Lys Asp Ile Ser
    290                 295                 300

Pro Arg Gln Arg Lys Val Ala Thr Ser Leu Lys Leu Ile Asn Asp Thr
305                 310                 315                 320

Leu Asp Asp Leu Ile Ala Thr Cys Lys Arg Met Val Glu Glu Glu Glu
                325                 330                 335
```

```
Leu Gln Phe His Glu Glu Tyr Met Asn Glu Arg Asp Pro Ser Ile Leu
            340                 345                 350

His Phe Leu Leu Ala Ser Gly Asp Asp Val Ser Ser Lys Gln Leu Arg
        355                 360                 365

Asp Asp Leu Met Thr Met Leu Ile Ala Gly His Glu Thr Ser Ala Ala
    370                 375                 380

Val Leu Thr Trp Thr Phe Tyr Leu Leu Thr Thr Glu Pro Ser Val Val
385                 390                 395                 400

Ala Lys Leu Gln Glu Glu Val Asp Ser Val Ile Gly Asp Arg Phe Pro
                405                 410                 415

Thr Ile Gln Asp Met Lys Lys Leu Lys Tyr Thr Thr Arg Val Met Asn
            420                 425                 430

Glu Ser Leu Arg Leu Tyr Pro Gln Pro Pro Val Leu Ile Arg Arg Ser
        435                 440                 445

Ile Asp Asn Asp Ile Leu Gly Glu Tyr Pro Ile Lys Arg Gly Glu Asp
    450                 455                 460

Ile Phe Ile Ser Val Trp Asn Leu His Arg Ser Pro Leu His Trp Asp
465                 470                 475                 480

Asp Ala Glu Lys Phe Asn Pro Glu Arg Trp Pro Leu Asp Gly Pro Asn
                485                 490                 495

Pro Asn Glu Thr Asn Gln Asn Phe Ser Tyr Leu Pro Phe Gly Gly Gly
            500                 505                 510

Pro Arg Lys Cys Ile Gly Asp Met Phe Ala Ser Phe Glu Asn Val Val
        515                 520                 525

Ala Ile Ala Met Leu Ile Arg Arg Phe Asn Phe Gln Ile Ala Pro Gly
    530                 535                 540

Ala Pro Pro Val Lys Met Thr Thr Gly Ala Thr Ile His Thr Thr Glu
545                 550                 555                 560
```

```
Gly Leu Lys Leu Thr Val Thr Lys Arg Thr Lys Pro Leu Asp Ile Pro
                565                 570                 575

Ser Val Pro Ile Leu Pro Met Asp Thr Ser Arg Asp Glu Val Ser Ser
            580                 585                 590

Ala Leu Ser
        595
```

<210> 34
<211> 632
<212> PRT
<213> Oryza sativa

<400> 34

```
Met Ala Ala Thr Ser Ser Ala Ala Ala Ala Ala Pro Pro Pro Cys Arg
1               5                   10                  15

Leu Leu Gly Ser Gly Gln Ala His Leu Arg Leu Pro Pro Ser Ala Ala
            20                  25                  30

Ala Ala Ala Ala Ser Ala Arg Arg Arg Leu Leu Leu Arg Cys Ala Ala
        35                  40                  45

Ser Gly Gly Asn Gly Lys Gly Gly Gly Gly Asp Gly Ser Gly Ser Asp
    50                  55                  60

Pro Val Leu Glu Glu Arg Arg Arg Arg Gln Ala Glu Leu Ala Ala
65                  70                  75                  80

Arg Ile Ala Ser Gly Glu Phe Thr Ala Gln Gly Pro Ala Trp Ile Ala
                85                  90                  95

Pro Leu Ala Val Gly Leu Ala Lys Leu Gly Pro Pro Gly Glu Leu Ala
            100                 105                 110

Ala Ala Leu Leu Thr Lys Val Ala Gly Gly Gly Gly Pro Glu Ile Pro
        115                 120                 125

Gln Ala Val Gly Ser Met Ser Ala Val Thr Gly Gln Ala Phe Phe Ile
    130                 135                 140

Pro Leu Tyr Asp Leu Phe Leu Thr Tyr Gly Gly Ile Phe Arg Leu Asn
145                 150                 155                 160

Phe Gly Pro Lys Ser Phe Leu Ile Val Ser Asp Pro Ala Ile Ala Lys
                165                 170                 175
```

```
His Ile Leu Arg Asp Asn Ser Lys Ala Tyr Ser Lys Gly Ile Leu Ala
            180                 185                 190

Glu Ile Leu Glu Phe Val Met Gly Thr Gly Leu Ile Pro Ala Asp Gly
        195                 200                 205

Glu Ile Trp Arg Val Arg Arg Arg Ala Ile Val Pro Ala Met His Gln
    210                 215                 220

Lys Tyr Val Thr Ala Met Ile Ser Leu Phe Gly Tyr Ala Ser Asp Arg
225                 230                 235                 240

Leu Cys Gln Lys Leu Asp Lys Ala Ala Thr Asp Gly Glu Asp Val Glu
                245                 250                 255

Met Glu Ser Leu Phe Ser Arg Leu Thr Leu Asp Val Ile Gly Lys Ala
            260                 265                 270

Val Phe Asn Tyr Asp Phe Asp Ser Leu Ser Tyr Asp Asn Gly Ile Val
        275                 280                 285

Glu Ala Val Tyr Val Thr Leu Arg Glu Ala Glu Met Arg Ser Thr Ser
    290                 295                 300

Pro Ile Pro Thr Trp Glu Ile Pro Ile Trp Lys Asp Ile Ser Pro Arg
305                 310                 315                 320

Gln Lys Lys Val Asn Glu Ala Leu Ala Leu Ile Asn Lys Thr Leu Asp
                325                 330                 335

Glu Leu Ile Asp Ile Cys Lys Arg Leu Val Glu Glu Glu Asp Leu Gln
            340                 345                 350

Phe His Glu Glu Tyr Met Asn Glu Gln Asp Pro Ser Ile Leu His Phe
        355                 360                 365

Leu Leu Ala Ser Gly Asp Asp Val Ser Ser Lys Gln Leu Arg Asp Asp
    370                 375                 380

Leu Met Thr Met Leu Ile Ala Gly His Glu Thr Ser Ala Ala Val Leu
385                 390                 395                 400

Thr Trp Thr Phe Tyr Leu Leu Ser Lys Tyr Pro Asn Val Met Ala Lys
                405                 410                 415

Leu Gln Asp Glu Ala Asp Thr Val Leu Gly Asp Arg Leu Pro Thr Ile
            420                 425                 430
```

```
Glu Asp Val Lys Lys Leu Lys Tyr Thr Thr Arg Val Ile Asn Glu Ser
        435                 440                 445

Leu Arg Leu Tyr Pro Gln Pro Pro Val Leu Ile Arg Arg Ser Ile Glu
    450                 455                 460

Glu Asp Met Leu Gly Gly Tyr Pro Ile Gly Arg Gly Glu Asp Ile Phe
465                 470                 475                 480

Ile Ser Val Trp Asn Leu His His Cys Pro Lys His Trp Asp Gly Ala
                485                 490                 495

Asp Val Phe Asn Pro Glu Arg Trp Pro Leu Asp Gly Pro Asn Pro Asn
            500                 505                 510

Glu Thr Asn Gln Asn Phe Ser Tyr Leu Pro Phe Gly Gly Gly Pro Arg
        515                 520                 525

Lys Cys Val Gly Asp Met Phe Ala Thr Phe Glu Thr Val Val Ala Thr
    530                 535                 540

Ala Met Leu Val Arg Arg Phe Asp Phe Gln Met Ala Pro Gly Ala Pro
545                 550                 555                 560

Pro Val Glu Met Thr Thr Gly Ala Thr Ile His Thr Thr Glu Gly Leu
                565                 570                 575

Lys Met Thr Val Thr Arg Arg Thr Lys Pro Pro Val Ile Pro Asn Leu
            580                 585                 590

Glu Met Lys Val Ile Ser Asp Ser Pro Glu Asn Met Ser Thr Thr Thr
        595                 600                 605

Ser Met Pro Val Ser Ala Ala Ser Ile Ala Ser Gly Glu Asp Gln Gln
    610                 615                 620

Gly Gln Val Ser Ala Thr Arg Ile
625                 630
```

<210> 35
<211> 508
<212> PRT
<213> Hordeum vulgare

<400> 35

Ser Ala Arg Gly Gln Ala Val Gly Ser Leu Ala Ser Val Ala Gly Glu
1 5 10 15

Ala Phe Phe Leu Pro Leu Tyr Asp Leu Phe Leu Thr Tyr Gly Gly Val
20 25 30

Phe Arg Leu Asn Phe Gly Pro Lys Ser Phe Leu Ile Val Ser Asp Pro
35 40 45

Asp Val Ala Lys His Ile Leu Arg Asp Asn Ser Lys Ala Tyr Ser Lys
50 55 60

Gly Ile Leu Ala Glu Ile Leu Glu Phe Val Met Gly Thr Gly Leu Ile
65 70 75 80

Pro Ala Asp Gly Glu Val Trp Arg Val Arg Arg Arg Ala Ile Val Pro
85 90 95

Ala Leu His Gln Lys Tyr Val Thr Ala Met Ile Gly Leu Phe Gly Asn
100 105 110

Ala Ser Asp Arg Leu Cys Gln Lys Leu Asp Lys Ala Ala Ser Asp Gly
115 120 125

Glu Asp Val Glu Met Glu Ser Leu Phe Ser Arg Leu Thr Leu Asp Val
130 135 140

Ile Gly Lys Ala Val Phe Asn Tyr Asp Phe Asp Ser Leu Ser Tyr Asp
145 150 155 160

Asn Gly Ile Val Glu Ala Val Tyr Val Thr Leu Arg Glu Ala Glu Met
165 170 175

Arg Ser Thr Ser Pro Ile Pro Thr Trp Glu Ile Pro Ile Trp Lys Asp
180 185 190

Ile Ser Pro Arg Gln Arg Lys Val Asn Glu Ala Leu Ala Leu Ile Asn
195 200 205

Asn Ile Leu Asp Glu Leu Ile Ala Thr Cys Lys Arg Met Val Asp Glu
210 215 220

```
Glu Asp Leu Gln Phe His Glu Glu Tyr Met Asn Glu Lys Asp Pro Ser
225                 230                 235                 240

Ile Leu His Phe Leu Leu Ala Ser Gly Asp Asp Val Ser Ser Lys Gln
                245                 250                 255

Leu Arg Asp Asp Leu Met Thr Met Leu Ile Ala Gly His Glu Thr Ser
            260                 265                 270

Ala Ala Val Leu Thr Trp Thr Phe Tyr Leu Leu Ser Lys Tyr Pro Asn
        275                 280                 285

Val Met Ser Lys Leu Gln Ala Glu Ala Asp Ala Val Leu Gly Asp Gly
    290                 295                 300

Leu Pro Thr Ile Asp Asp Val Lys Lys Leu Lys Tyr Thr Thr Arg Val
305                 310                 315                 320

Ile Asn Glu Ser Leu Arg Leu Tyr Pro Gln Pro Pro Val Leu Ile Arg
                325                 330                 335

Arg Ser Leu Glu Asp Asp Met Leu Gly Glu Tyr Pro Ile Gly Lys Gly
            340                 345                 350

Glu Asp Ile Phe Ile Ser Ile Trp Asn Leu His Arg Cys Pro Lys His
        355                 360                 365

Trp Asp Asp Ala Asp Val Phe Asn Pro Glu Arg Trp Pro Leu Asp Gly
    370                 375                 380

Pro Asn Pro Asn Glu Thr Asn Gln Lys Phe Ser Tyr Leu Pro Phe Gly
385                 390                 395                 400

Gly Gly Pro Arg Lys Cys Val Gly Asp Met Phe Ala Thr Phe Glu Thr
                405                 410                 415

Val Val Ala Thr Ala Met Leu Val Lys Arg Phe Asp Phe Gln Met Ala
            420                 425                 430

Pro Gly Ala Pro Pro Val Glu Met Thr Thr Gly Ala Thr Ile His Thr
        435                 440                 445

Thr Lys Gly Leu Asn Met Thr Val Thr Arg Arg Ile Lys Pro Pro Val
    450                 455                 460

Ile Pro Asn Leu Glu Met Lys Ile Val Ser Asp Pro Glu Gly Ser Thr
465                 470                 475                 480
```

Ser Ser Thr Ala Ser Val Ala Val Ser Thr Ala Ser Ile Ala Ser Gly
485 490 495

Glu Gly Gln Gln Val Glu Val Ser Thr Ser Gln Val
500 505

<210> 36
<211> 425
<212> PRT
<213> Glycine max

<400> 36

Gly Lys Gly Leu Ile Pro Ala Asp Gly Glu Ile Trp Arg Val Arg Arg
1 5 10 15

Arg Ala Ile Val Pro Ala Leu His Gln Lys Tyr Val Ala Ala Met Ile
20 25 30

Gly Leu Phe Gly Gln Ala Ala Asp Arg Leu Cys Gln Lys Leu Asp Ala
35 40 45

Ala Ala Ser Asp Gly Glu Asp Val Glu Met Glu Ser Leu Phe Ser Arg
50 55 60

Leu Thr Leu Asp Ile Ile Gly Lys Ala Val Phe Asn Tyr Asp Phe Asp
65 70 75 80

Ser Leu Ser Asn Asp Thr Gly Ile Val Glu Ala Val Tyr Thr Val Leu
85 90 95

Arg Glu Ala Glu Asp Arg Ser Val Ala Pro Ile Pro Val Trp Glu Ile
100 105 110

Pro Ile Trp Lys Asp Ile Ser Pro Arg Leu Arg Lys Val Asn Ala Ala
115 120 125

Leu Lys Phe Ile Asn Asp Thr Leu Asp Asp Leu Ile Ala Ile Cys Lys
130 135 140

Arg Met Val Asp Glu Glu Glu Leu Gln Phe His Glu Glu Tyr Met Asn
145 150 155 160

Glu Gln Asp Pro Ser Ile Leu His Phe Leu Leu Ala Ser Gly Asp Asp
165 170 175

Val Ser Ser Lys Gln Leu Arg Asp Asp Leu Met Thr Met Leu Ile Ala
180 185 190

```
Gly His Glu Thr Ser Ala Ala Val Leu Thr Trp Thr Phe Tyr Leu Leu
        195                 200                 205

Ser Lys Glu Pro Arg Val Met Ser Lys Leu Gln Glu Glu Val Asp Ser
    210                 215                 220

Val Leu Gly Asp Gln Tyr Pro Thr Ile Glu Asp Met Lys Lys Leu Lys
225                 230                 235                 240

Tyr Thr Thr Arg Val Ile Asn Glu Ser Leu Arg Leu Tyr Pro Gln Pro
                245                 250                 255

Pro Val Leu Ile Arg Arg Ser Leu Glu Asp Asp Val Leu Gly Glu Tyr
            260                 265                 270

Pro Ile Lys Arg Gly Glu Asp Ile Phe Ile Ser Val Trp Asn Leu His
        275                 280                 285

Arg Ser Pro Lys Leu Trp Asp Asp Ala Asp Lys Phe Lys Pro Glu Arg
    290                 295                 300

Trp Ala Leu Asp Gly Pro Ser Pro Asn Glu Thr Asn Gln Asn Phe Lys
305                 310                 315                 320

Tyr Leu Pro Phe Gly Gly Gly Pro Arg Lys Cys Val Gly Asp Leu Phe
                325                 330                 335

Ala Ser Tyr Glu Thr Val Val Ala Leu Ala Met Leu Met Arg Arg Phe
            340                 345                 350

Asn Phe Gln Ile Ala Val Gly Ala Pro Pro Val Glu Met Thr Thr Gly
        355                 360                 365

Ala Thr Ile His Thr Thr Gln Gly Leu Lys Met Thr Val Thr His Arg
    370                 375                 380

Ile Lys Pro Pro Ile Val Pro Ser Leu Gln Met Ser Thr Leu Glu Val
385                 390                 395                 400

Asp Pro Ser Ile Ser Leu Ser Asp Gln Asp Glu Val Ser Gln Lys Gly
                405                 410                 415

Glu Val Tyr Gln Ala Gln Ala Gln Ser
            420                 425
```

<210> 37
<211> 342
<212> PRT
<213> Triticum aestivum

<400> 37

```
Gly Cys Arg Leu Pro Gln Ala Val Gly Ser Leu Ala Ser Val Ala Gly
1               5                  10                  15

Glu Ala Phe Phe Leu Pro Leu Tyr Asp Leu Phe Leu Thr Tyr Gly Gly
            20                  25                  30

Val Phe Arg Leu Asn Phe Gly Pro Lys Ser Phe Leu Ile Val Ser Asp
        35                  40                  45

Pro Asp Val Ala Lys His Ile Leu Arg Asp Asn Ser Lys Ala Tyr Ser
    50                  55                  60

Lys Gly Ile Leu Ala Glu Ile Leu Glu Phe Val Met Gly Thr Gly Leu
65                  70                  75                  80

Ile Pro Ala Asp Gly Glu Val Trp Arg Val Arg Arg Arg Ala Ile Val
                85                  90                  95

Pro Ala Leu His Gln Lys Tyr Val Thr Ala Met Ile Gly Leu Phe Gly
            100                 105                 110

Asn Ala Ser Asp Arg Leu Cys Gln Lys Leu Asp Lys Ala Ala Ser Asp
        115                 120                 125

Gly Glu Asp Val Glu Met Glu Ser Leu Phe Ser Arg Leu Thr Leu Asp
    130                 135                 140

Val Ile Gly Lys Ala Val Phe Asn Tyr Asp Phe Asp Ser Leu Ser Tyr
145                 150                 155                 160

Asp Asn Gly Ile Val Glu Ala Val Tyr Val Thr Leu Arg Glu Ala Glu
                165                 170                 175

Met Arg Ser Thr Ser Pro Ile Pro Thr Trp Glu Ile Pro Ile Trp Lys
            180                 185                 190

Asp Ile Ser Pro Arg Gln Cys Pro Lys His Trp Asp Asp Ala Asp Val
        195                 200                 205

Phe Asn Pro Glu Arg Trp Pro Leu Asp Gly Pro Asn Pro Asn Glu Thr
    210                 215                 220
```

```
Asn Gln Lys Phe Ser Tyr Leu Pro Phe Gly Gly Gly Pro Arg Lys Cys
225                 230                 235                 240

Val Gly Asp Met Phe Ala Thr Phe Glu Thr Val Val Ala Thr Ala Met
                245                 250                 255

Leu Val Lys Arg Phe Asp Phe Gln Met Ala Pro Gly Ala Pro Pro Val
            260                 265                 270

Glu Met Thr Thr Gly Ala Thr Ile His Thr Thr Lys Gly Leu Asn Met
        275                 280                 285

Thr Val Thr Arg Arg Ile Lys Pro Pro Val Ile Pro Asn Leu Glu Met
    290                 295                 300

Lys Ile Val Ser Asp Ser Glu Gly Ser Thr Ser Ser Thr Ala Ser Val
305                 310                 315                 320

Ala Val Ser Thr Ala Ser Ile Ala Ser Gly Glu Gly Gln Gln Val Glu
                325                 330                 335

Val Ser Thr Ser Gln Val
            340
```

<210> 38
<211> 579
<212> PRT
<213> Lycopersicon esculentum

<400> 38

```
Gln Phe Pro Thr His His Tyr Ser Lys Ser Arg Leu Thr Leu Ser Pro
1               5                   10                  15

Lys Phe Lys Gly Ser Val Ser Asn Phe Thr Ile Arg Cys Ser Asn Ser
            20                  25                  30

Asn Gly Lys Gln Pro Glu Ser Val Asp Glu Gly Val Lys Lys Val Glu
        35                  40                  45

Lys Leu Leu Asp Glu Lys Arg Arg Ala Glu Leu Ser Ala Arg Ile Ala
    50                  55                  60

Ser Gly Glu Phe Thr Val Glu Gln Ser Gly Phe Pro Ser Leu Leu Lys
65                  70                  75                  80

Asn Gly Leu Ser Lys Leu Gly Val Pro Lys Glu Phe Leu Glu Phe Phe
                85                  90                  95
```

Ser Arg Arg Thr Gly Asn Tyr Pro Arg Ile Pro Glu Ala Lys Gly Ser
100 105 110

Ile Ser Ala Ile Arg Asp Glu Pro Phe Phe Met Pro Leu Tyr Glu Leu
115 120 125

Tyr Leu Thr Tyr Gly Gly Ile Phe Arg Leu Ile Phe Gly Pro Lys Ser
130 135 140

Phe Leu Ile Val Ser Asp Pro Ser Ile Ala Lys His Ile Leu Lys Asp
145 150 155 160

Asn Ser Lys Ala Tyr Ser Lys Gly Ile Leu Ala Glu Ile Leu Asp Phe
165 170 175

Val Met Gly Lys Gly Leu Ile Pro Ala Asp Gly Glu Ile Trp Arg Val
180 185 190

Arg Arg Arg Ala Ile Val Pro Ala Leu His Gln Lys Tyr Val Ala Ala
195 200 205

Met Ile Gly Leu Phe Gly Lys Ala Thr Asp Arg Leu Cys Lys Lys Leu
210 215 220

Asp Val Ala Ala Thr Asp Gly Glu Asp Val Glu Met Glu Ser Leu Phe
225 230 235 240

Ser Arg Leu Thr Leu Asp Ile Ile Gly Lys Ala Val Phe Asn Tyr Asp
245 250 255

Phe Asp Ser Leu Thr Val Asp Thr Gly Ile Val Glu Ala Val Tyr Thr
260 265 270

Val Leu Arg Glu Ala Glu Asp Arg Ser Val Ala Pro Ile Pro Val Trp
275 280 285

Glu Leu Pro Ile Trp Lys Asp Ile Ser Pro Lys Leu Lys Lys Val Asn
290 295 300

Ala Ala Leu Lys Leu Ile Asn Asp Thr Leu Asp Asp Leu Ile Ala Ile
305 310 315 320

Cys Lys Arg Met Val Asp Glu Glu Glu Leu Gln Phe His Glu Glu Tyr
325 330 335

Met Asn Glu Lys Asp Pro Ser Ile Leu His Phe Leu Leu Ala Ser Gly
340 345 350

```
Asp Glu Val Ser Ser Lys Gln Leu Arg Asp Asp Leu Met Thr Met Leu
        355                 360                 365

Ile Ala Gly His Glu Thr Ser Ala Ala Val Leu Thr Trp Thr Phe Tyr
    370                 375                 380

Leu Leu Ser Lys Glu Pro Ser Val Met Ala Lys Leu Gln Asp Glu Val
385                 390                 395                 400

Asp Ser Val Leu Gly Asp Arg Leu Pro Thr Ile Glu Asp Leu Lys Lys
                405                 410                 415

Leu Arg Tyr Thr Thr Arg Val Ile Asn Glu Ser Leu Arg Leu Tyr Pro
            420                 425                 430

Gln Pro Pro Val Leu Ile Arg Arg Ser Ile Glu Glu Asp Val Val Gly
        435                 440                 445

Gly Tyr Pro Ile Lys Arg Gly Glu Asp Ile Phe Ile Ser Val Trp Asn
    450                 455                 460

Leu His Arg Cys Pro Asn His Trp Glu Glu Ala Asp Arg Phe Asn Pro
465                 470                 475                 480

Glu Arg Trp Pro Leu Asp Gly Pro Asn Pro Asn Glu Thr Asn Gln Asn
                485                 490                 495

Phe Ser Tyr Leu Pro Phe Gly Gly Gly Pro Arg Lys Cys Val Gly Asp
            500                 505                 510

Met Phe Ala Thr Phe Glu Asn Leu Val Ala Val Ala Met Leu Val Gln
        515                 520                 525

Arg Phe Asp Phe Gln Met Ala Leu Gly Ala Pro Pro Val Lys Met Thr
    530                 535                 540

Thr Gly Ala Thr Ile His Thr Thr Glu Gly Leu Lys Met Thr Val Thr
545                 550                 555                 560

Arg Arg Ser Arg Pro Pro Ile Val Pro Asn Leu Glu Met Ala Thr Leu
                565                 570                 575

Glu Val Asp
```

<210> 39
<211> 367
<212> PRT
<213> Chlamydomonas reinhardtii

<400> 39

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Ala Arg Arg Arg Ala Val Val Pro Ala Leu His Arg Lys Tyr Val Met
1               5                  10                  15

Ser Met Val Asp Met Phe Gly Asp Cys Ala Ala His Gly Ala Ser Ala
            20                  25                  30

Thr Leu Asp Lys Tyr Ala Ala Ser Gly Thr Ser Leu Asp Met Glu Asn
        35                  40                  45

Phe Phe Ser Arg Leu Gly Leu Asp Ile Ile Gly Lys Ala Val Phe Asn
    50                  55                  60

Tyr Asp Phe Asp Ser Leu Ala His Asp Asp Pro Val Ile Gln Ala Val
65                  70                  75                  80

Tyr Thr Leu Leu Arg Glu Ala Glu His Arg Ser Thr Ala Pro Ile Ala
                85                  90                  95

Tyr Trp Asn Ile Pro Gly Ile Gln Phe Val Val Pro Arg Gln Lys Arg
            100                 105                 110

Cys Gln Glu Ala Leu Val Leu Val Asn Glu Cys Leu Asp Gly Leu Ile
        115                 120                 125

Asp Lys Cys Lys Lys Leu Val Glu Glu Glu Asp Ala Val Phe Gly Glu
    130                 135                 140

Glu Phe Leu Ser Glu Arg Asp Pro Ser Ile Leu His Phe Leu Leu Ala
145                 150                 155                 160

Ser Gly Asp Glu Ile Ser Ser Lys Gln Leu Arg Asp Asp Leu Met Thr
                165                 170                 175

Met Leu Ile Ala Gly His Glu Thr Thr Ala Ala Val Leu Thr Trp Thr
            180                 185                 190

Leu Tyr Leu Leu Ser Gln His Pro Glu Ala Ala Ala Ala Ile Arg Lys
        195                 200                 205

Glu Val Asp Glu Leu Leu Gly Asp Arg Lys Pro Gly Val Glu Asp Leu
    210                 215                 220
```

```
Arg Ala Leu Lys Met Thr Thr Arg Val Ile Asn Glu Ala Met Arg Leu
225                 230                 235                 240

Tyr Pro Gln Pro Pro Val Leu Ile Arg Arg Ala Leu Gln Asp Asp His
                245                 250                 255

Phe Asp Gln Phe Thr Val Pro Ala Gly Ser Asp Leu Phe Ile Ser Val
            260                 265                 270

Trp Asn Leu His Arg Ser Pro Lys Leu Trp Asp Glu Pro Asp Lys Phe
        275                 280                 285

Lys Pro Glu Arg Phe Gly Pro Leu Asp Ser Pro Ile Pro Asn Glu Val
    290                 295                 300

Thr Glu Asn Phe Ala Tyr Leu Pro Phe Gly Gly Gly Arg Arg Lys Cys
305                 310                 315                 320

Ile Gly Asp Gln Phe Ala Leu Phe Glu Ala Val Val Ala Leu Ala Met
                325                 330                 335

Leu Met Arg Arg Tyr Glu Phe Asn Leu Asp Glu Ser Lys Gly Thr Val
            340                 345                 350

Gly Met Thr Thr Gly Ala Thr Ile His Thr Thr Asn Gly Leu Asn
        355                 360                 365
```

<210> 40
<211> 2057
<212> DNA
<213> Arabidopsis thaliana

<400> 40

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tcgtcgagtt ctaatggacg agatccttta gaggagaatt cagtacctaa tggtgtgaaa    180

agcttggaga agcttcaaga agagaagcgt cgtgctgagt tatctgctag gattgcttct    240

ggagctttca ctgtacggaa atctagtttt ccatctacag tgaagaatgg tttatctaag    300

attggaatac caagcaatgt tcttgatttc atgtttgatt ggactggttc tgaccaagac    360

taccccaagg ttcctgaggc taaaggctcg attcaggcgg tccggaacga agctttcttc    420

atccctttgt atgagctttt ccttacttat ggtggaattt tcaggttgac ctttgggcct    480

aagtcattct tgatcgtgtc ggatccttct attgctaaac atatattgaa ggacaatgca    540

aaagcttact ccaaggggat tttagctgaa attctagatt ttgtgatggg aaaaggactc    600
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attcctgctg atggggagat atggcgtaga cgaaggcgtg ccattgttcc tgcattgcat 660

caaaagtatg tagcagctat gattagttta ttcggagaag cttcagatag gctttgtcag 720

aagcttgatg ctgctgcatt gaaaggggaa gaagtagaga tggaatcact cttctctcgt 780

ttgacacttg atattattgg caaggcggtt ttcaattacg actttgactc ccttactaat 840

gataccggtg tgatcgaggc agtgtacact gttctaagag aagctgaaga cagaagtgtt 900

tcacctattc ctgtttggga catacccatt tggaaagata tttccccacg tcagaggaaa 960

gttgctactt ccttgaaatt aatcaatgac acacttgatg atttgattgc aacatgcaag 1020

agaatggtag aagaagagga gttgcagttt cacgaggagt atatgaacga aagagatcct 1080

agcatccttc actttctttt agcttcagga gatgatgtct ctagtaagca gcttcgtgat 1140

gacttgatga caatgcttat agccggacat gaaacatcgg cggcagtatt aacatggacc 1200

ttttaccttt taacaacgga accaagtgta gttgccaaac ttcaagaaga ggttgattct 1260

gtaattggag atagattccc aaccatacaa gatatgaaaa agctgaaata cactactcga 1320

gtcatgaatg agtcattgag attatatcca caaccaccag tactgatccg tcgttctata 1380

gataatgata tacttggaga gtatccgata aaaaggggag aggatatctt catctcggtt 1440

tggaatctac atcgaagtcc tctgcattgg gatgatgcag agaagttcaa tcccgagaga 1500

tggcctttgg atggaccaaa cccaaatgag acaaaccaaa acttcagtta cttacctttc 1560

ggtggaggac cgcggaaatg tataggcgac atgtttgctt cctttgagaa tgtggtagca 1620

atcgcaatgc ttattcgaag atttaacttt cagattgcac caggagctcc tccggtgaaa 1680

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ggtcccaagt ctttttaat agtttctgat ccatcaatag ccaaacacat actgaaagat 480

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ggacttatac ctgcagatgg agaaatttgg cgcgtcaggc ggcgtgccat tgtaccagca 600

ttgcaccaaa agtacgtagc agctatgatt ggcttatttg gaaaagcaac cgataggttg 660

tgcaaaaagc ttgatgttgc tgcaactgat ggagaagatg tagagatgga atcacttttc 720

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agtgttgcac caattccagt ttgggagttg cctatctgga aagatatctc tccgaagcta 900

aaaaaggtta atgcagctct caagttgatt aatgacacat tggatgatct gattgctata 960

tgtaagagga tggtagacga agaagagttg cagtttcacg aggaatacat gaatgaaaaa 1020

gatcctagca tcctccattt cttgttagca tctggagatg aggtctcaag caagcaactt 1080

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cccttcggtg gtggaccaag aaaatgtgtg ggagacatgt ttgccacatt tgagaattta 1560

gtagcagttg caatgcttgt tcaacgattt gattttcaaa tggctcttgg agctcctcct 1620

gttaaaatga caactggggc taccatccac accacagaag gattaaaaat gactgtaaca 1680

cgaagatcaa gacctccaat agttcccaac ttggagatgg caacattaga agtagat 1737

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<212> DNA
<213> Chlamydomonas reinhardtii

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ggcaccagcc tggacatgga aaacttcttc agccggctgg gtctggacat catcggcaag 180

gccgtgttca actacgactt cgactcgctg gcgcacgacg accccgtcat ccaggccgtg 240

tacacgttgc tgcgcgaagc ggagcaccgc tccacagcgc ccatcgccta ctggaacatt 300

cccggcatcc agtttgtggt gccgcggcag aagcgctgcc aggaggcgct ggtgctggta 360

aatgagtgcc tggacggcct catcgacaag tgcaagaagc tggtcgagga ggaggacgcg 420

gtgtttgggg aggagttcct tagcgagcgc gacccctcca tcctgcactt cctcctcgcg 480

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gtggaagacc tcagagcgct caagatgacg actcgcgtca tcaacgaggc gatgcggctc 720

tacccacagc cgccagtact cattcgccgc gcgctgcagg acgaccactt cgaccagttc 780

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<211> 576
<212> PRT
<213> Arabidopsis thaliana

<400> 49

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Gln Thr Ile Ser Ser Val Asn Ser Arg Arg Ala Ser Val Ser Ile Lys
35 40 45

Cys Gln Ser Thr Glu Pro Lys Thr Asn Gly Asn Ile Leu Asp Asn Ala
50 55 60

Ser Asn Leu Leu Thr Asn Phe Leu Ser Gly Gly Ser Leu Gly Ser Met
65 70 75 80

Pro Thr Ala Glu Gly Ser Val Ser Asp Leu Phe Gly Lys Pro Leu Phe
85 90 95

Leu Ser Leu Tyr Asp Trp Phe Leu Glu His Gly Gly Ile Tyr Lys Leu
100 105 110

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Ala Phe Gly Pro Lys Ala Phe Val Val Ile Ser Asp Pro Ile Ile Ala
        115                 120                 125

Arg His Val Leu Arg Glu Asn Ala Phe Ser Tyr Asp Lys Gly Val Leu
    130                 135                 140

Ala Glu Ile Leu Glu Pro Ile Met Gly Lys Gly Leu Ile Pro Ala Asp
145                 150                 155                 160

Leu Asp Thr Trp Lys Leu Arg Arg Arg Ala Ile Thr Pro Ala Phe His
                165                 170                 175

Lys Leu Tyr Leu Glu Ala Met Val Lys Val Phe Ser Asp Cys Ser Glu
            180                 185                 190

Lys Met Ile Leu Lys Ser Glu Lys Leu Ile Arg Glu Lys Glu Thr Ser
        195                 200                 205

Ser Gly Glu Asp Thr Ile Glu Leu Asp Leu Glu Ala Glu Phe Ser Ser
    210                 215                 220

Leu Ala Leu Asp Ile Ile Gly Leu Ser Val Phe Asn Tyr Asp Phe Gly
225                 230                 235                 240

Ser Val Thr Lys Glu Ser Pro Val Ile Lys Ala Val Tyr Gly Thr Leu
                245                 250                 255

Phe Glu Ala Glu His Arg Ser Thr Phe Tyr Phe Pro Tyr Trp Asn Phe
            260                 265                 270

Pro Pro Ala Arg Trp Ile Val Pro Arg Gln Arg Lys Phe Gln Ser Asp
        275                 280                 285

Leu Lys Ile Ile Asn Asp Cys Leu Asp Gly Leu Ile Gln Asn Ala Lys
    290                 295                 300

Glu Thr Arg Gln Glu Thr Asp Val Glu Lys Leu Gln Glu Arg Asp Tyr
305                 310                 315                 320

Thr Asn Leu Lys Asp Ala Ser Leu Leu Arg Phe Leu Val Asp Met Arg
                325                 330                 335

Gly Val Asp Ile Asp Asp Arg Gln Leu Arg Asp Asp Leu Met Thr Met
            340                 345                 350

Leu Ile Ala Gly His Glu Thr Thr Ala Ala Val Leu Thr Trp Ala Val
        355                 360                 365
```

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Phe Leu Leu Ser Gln Asn Pro Glu Lys Ile Arg Lys Ala Gln Ala Glu
    370                 375                 380

Ile Asp Ala Val Leu Gly Gln Gly Pro Pro Thr Tyr Glu Ser Met Lys
385                 390                 395                 400

Lys Leu Glu Tyr Ile Arg Leu Ile Val Val Glu Val Leu Arg Leu Phe
                405                 410                 415

Pro Gln Pro Pro Leu Leu Ile Arg Arg Thr Leu Lys Pro Glu Thr Leu
            420                 425                 430

Pro Gly Gly His Lys Gly Glu Lys Glu Gly His Lys Val Pro Lys Gly
        435                 440                 445

Thr Asp Ile Phe Ile Ser Val Tyr Asn Leu His Arg Ser Pro Tyr Phe
    450                 455                 460

Trp Asp Asn Pro His Asp Phe Glu Pro Glu Arg Phe Leu Arg Thr Lys
465                 470                 475                 480

Glu Ser Asn Gly Ile Glu Gly Trp Ala Gly Phe Asp Pro Ser Arg Ser
                485                 490                 495

Pro Gly Ala Leu Tyr Pro Asn Glu Ile Ile Ala Asp Phe Ala Phe Leu
            500                 505                 510

Pro Phe Gly Gly Gly Pro Arg Lys Cys Ile Gly Asp Gln Phe Ala Leu
        515                 520                 525

Met Glu Ser Thr Val Ala Leu Ala Met Leu Phe Gln Lys Phe Asp Val
    530                 535                 540

Glu Leu Arg Gly Thr Pro Glu Ser Val Glu Leu Val Ser Gly Ala Thr
545                 550                 555                 560

Ile His Ala Lys Asn Gly Met Trp Cys Lys Leu Lys Arg Arg Ser Lys
                565                 570                 575
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<211> 552
<212> PRT
<213> Pisum sativum

<400> 50

Met Val Ala Ala Pro Ile Ser Thr Val Lys Leu Thr Asp Ala Asn Leu
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His Thr Arg Phe His Ser Ser Ser Ser Ser Thr Pro Ser Thr Leu Ser
20 25 30

Leu Pro Leu Ser Leu His Phe His Phe Ser Ser His Ser Lys Arg Phe
35 40 45

Ser Ser Ile Arg Cys Gln Ser Val Asn Gly Glu Lys Arg Lys Gln Ser
50 55 60

Ser Arg Asn Val Phe Asp Asn Ala Ser Asn Leu Leu Thr Ser Leu Leu
65 70 75 80

Ser Gly Ala Asn Leu Gly Ser Met Pro Ile Ala Glu Gly Ala Val Thr
85 90 95

Asp Leu Phe Asp Arg Pro Leu Phe Phe Ser Leu Tyr Asp Trp Phe Leu
100 105 110

Glu His Gly Ser Val Tyr Lys Leu Ala Phe Gly Pro Lys Ala Phe Val
115 120 125

Val Val Ser Asp Pro Ile Val Ala Arg His Ile Leu Arg Glu Asn Ala
130 135 140

Phe Ser Tyr Asp Lys Gly Val Leu Ala Asp Ile Leu Glu Pro Ile Met
145 150 155 160

Gly Lys Gly Leu Ile Pro Ala Asp Leu Glu Thr Trp Lys Gln Arg Arg
165 170 175

Arg Val Ile Ala Pro Gly Phe His Thr Ser Tyr Leu Glu Ala Met Val
180 185 190

Gln Leu Phe Thr Ser Cys Ser Glu Arg Thr Val Leu Lys Val Asn Glu
195 200 205

Leu Leu Glu Gly Glu Gly Arg Asp Gly Gln Lys Ser Val Glu Leu Asp
210 215 220

Leu Glu Ala Glu Phe Ser Asn Leu Ala Leu Glu Ile Ile Gly Leu Gly
225 230 235 240

Val Phe Asn Tyr Asp Phe Gly Ser Val Thr Asn Glu Ser Pro Val Ile
245 250 255

Lys Ala Val Tyr Gly Thr Leu Phe Glu Ala Glu His Arg Ser Thr Phe
260 265 270

Tyr Ile Pro Tyr Trp Lys Phe Pro Leu Ala Arg Trp Ile Val Pro Arg
275 280 285

Gln Arg Lys Phe Gln Asp Asp Leu Lys Val Ile Asn Thr Cys Leu Asp
290 295 300

Gly Leu Ile Arg Asn Ala Lys Glu Ser Arg Gln Glu Thr Asp Val Glu
305 310 315 320

Lys Leu Gln Gln Arg Asp Tyr Ser Asn Leu Lys Asp Ala Ser Leu Leu
325 330 335

Arg Phe Leu Val Asp Met Arg Gly Val Asp Val Asp Asp Arg Gln Leu
340 345 350

Arg Asp Asp Leu Met Thr Met Leu Ile Ala Gly His Glu Thr Thr Ala
355 360 365

Ala Val Leu Thr Trp Ala Val Phe Leu Leu Ala Gln Asn Pro Asp Lys
370 375 380

Met Lys Lys Ala Gln Ala Glu Val Asp Leu Val Leu Gly Met Gly Lys
385 390 395 400

Pro Thr Phe Glu Leu Leu Lys Lys Leu Glu Tyr Ile Arg Leu Ile Val
405 410 415

Val Glu Thr Leu Arg Leu Tyr Pro Gln Pro Pro Leu Leu Ile Arg Arg
420 425 430

Ser Leu Lys Pro Asp Val Leu Pro Gly Gly His Lys Gly Asp Lys Asp
435 440 445

Gly Tyr Thr Ile Pro Ala Gly Thr Asp Val Phe Ile Ser Val Tyr Asn
450 455 460

Leu His Arg Ser Pro Tyr Phe Trp Asp Arg Pro Asn Asp Phe Glu Pro
465 470 475 480

Glu Arg Phe Leu Val Gln Asn Asn Asn Glu Glu Val Glu Gly Trp Ala
485 490 495

Gly Phe Asp Pro Ser Arg Ser Pro Gly Ala Leu Tyr Pro Asn Glu Ile
500 505 510

Ile Ser Asp Phe Ala Phe Leu Pro Phe Gly Gly Gly Pro Arg Lys Cys
515 520 525

Val Gly Asp Gln Phe Ala Leu Met Glu Ser Thr Val Ala Leu Val Cys
530 535 540

Cys Tyr Arg Ile Ser Met Trp Asn
545 550

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<211> 576
<212> PRT
<213> Glycine max

<400> 51

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Leu His Ser Arg Phe His Ser Arg Leu Val Pro Phe Thr His His Phe
20 25 30

Ser Leu Ser Gln Pro Lys Arg Ile Ser Ser Ile Arg Cys Gln Ser Ile
35 40 45

Asn Thr Asp Lys Lys Lys Ser Ser Arg Asn Leu Leu Gly Asn Ala Ser
50 55 60

Asn Leu Leu Thr Asp Leu Leu Ser Gly Gly Ser Ile Gly Ser Met Pro
65 70 75 80

Ile Ala Glu Gly Ala Val Ser Asp Leu Leu Gly Arg Pro Leu Phe Phe
85 90 95

Ser Leu Tyr Asp Trp Phe Leu Glu His Gly Ala Val Tyr Lys Leu Ala
100 105 110

Phe Gly Pro Lys Ala Phe Val Val Val Ser Asp Pro Ile Val Ala Arg
115 120 125

His Ile Leu Arg Glu Asn Ala Phe Ser Tyr Asp Lys Gly Val Leu Ala
130 135 140

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Asp Ile Leu Glu Pro Ile Met Gly Lys Gly Leu Ile Pro Ala Asp Leu
145                 150                 155                 160

Asp Thr Trp Lys Gln Arg Arg Arg Val Ile Ala Pro Ala Phe His Asn
                165                 170                 175

Ser Tyr Leu Glu Ala Met Val Lys Ile Phe Thr Thr Cys Ser Glu Arg
            180                 185                 190

Thr Ile Leu Lys Phe Asn Lys Leu Leu Glu Gly Glu Gly Tyr Asp Gly
        195                 200                 205

Pro Asp Ser Ile Glu Leu Asp Leu Glu Ala Glu Phe Ser Ser Leu Ala
    210                 215                 220

Leu Asp Ile Ile Gly Leu Gly Val Phe Asn Tyr Asp Phe Gly Ser Val
225                 230                 235                 240

Thr Lys Glu Ser Pro Val Ile Lys Ala Val Tyr Gly Thr Leu Phe Glu
                245                 250                 255

Ala Glu His Arg Ser Thr Phe Tyr Ile Pro Tyr Trp Lys Ile Pro Leu
            260                 265                 270

Ala Arg Trp Ile Val Pro Arg Gln Arg Lys Phe Gln Asp Asp Leu Lys
        275                 280                 285

Val Ile Asn Thr Cys Leu Asp Gly Leu Ile Arg Asn Ala Lys Glu Ser
    290                 295                 300

Arg Gln Glu Thr Asp Val Glu Lys Leu Gln Gln Arg Asp Tyr Leu Asn
305                 310                 315                 320

Leu Lys Asp Ala Ser Leu Leu Arg Phe Leu Val Asp Met Arg Gly Ala
                325                 330                 335

Asp Val Asp Asp Arg Gln Leu Arg Asp Asp Leu Met Thr Met Leu Ile
            340                 345                 350

Ala Gly His Glu Thr Thr Ala Ala Val Leu Thr Trp Ala Val Phe Leu
        355                 360                 365
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Leu Ala Gln Asn Pro Ser Lys Met Lys Lys Ala Gln Ala Glu Val Asp
    370                 375                 380

Leu Val Leu Gly Thr Gly Arg Pro Thr Phe Glu Ser Leu Lys Glu Leu
385                 390                 395                 400

Gln Tyr Ile Arg Leu Ile Val Val Glu Ala Leu Arg Leu Tyr Pro Gln
                405                 410                 415

Pro Pro Leu Leu Ile Arg Arg Ser Leu Lys Ser Asp Val Leu Pro Gly
            420                 425                 430

Gly His Lys Gly Glu Lys Asp Gly Tyr Ala Ile Pro Ala Gly Thr Asp
        435                 440                 445

Val Phe Ile Ser Val Tyr Asn Leu His Arg Ser Pro Tyr Phe Trp Asp
    450                 455                 460

Arg Pro Asp Asp Phe Glu Pro Glu Arg Phe Leu Val Gln Asn Lys Asn
465                 470                 475                 480

Glu Glu Ile Glu Gly Trp Ala Gly Leu Asp Pro Ser Arg Ser Pro Gly
                485                 490                 495

Ala Leu Tyr Pro Asn Glu Val Ile Ser Asp Phe Ala Phe Leu Pro Phe
            500                 505                 510

Gly Gly Gly Pro Arg Lys Cys Val Gly Asp Gln Phe Ala Leu Met Glu
        515                 520                 525

Ser Thr Val Ala Leu Thr Met Leu Leu Gln Asn Phe Asp Val Glu Leu
    530                 535                 540

Lys Gly Thr Pro Glu Ser Val Glu Leu Val Thr Gly Ala Thr Ile His
545                 550                 555                 560

Thr Lys Asn Gly Leu Trp Cys Asn Leu Arg Lys Arg Ser Ser Leu His
                565                 570                 575
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<211> 588
<212> PRT
<213> Oryza sativa

<400> 52

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Pro Pro Pro Pro Pro Leu Val Ser Pro Arg Leu Arg Arg Gly His Val
            20                  25                  30

Arg Leu Arg Leu Arg Pro Pro Arg Ser Ser Gly Gly Gly Phe Thr Gly
        35                  40                  45

Gly Gly Gly Ala Gly Gly Asp Glu Pro Pro Ile Thr Thr Ser Trp Val
    50                  55                  60

Ser Pro Asp Trp Leu Thr Ala Leu Ser Arg Ser Val Ala Thr Arg Leu
65                  70                  75                  80

Gly Gly Gly Asp Asp Ser Gly Ile Pro Val Ala Ser Ala Lys Leu Asp
                85                  90                  95

Asp Val Arg Asp Leu Leu Gly Gly Ala Leu Phe Leu Pro Leu Phe Lys
            100                 105                 110

Trp Phe Arg Glu Glu Gly Pro Val Tyr Arg Leu Ala Ala Gly Pro Arg
        115                 120                 125

Asp Leu Val Val Val Ser Asp Pro Ala Val Ala Arg His Val Leu Arg
    130                 135                 140

Gly Tyr Gly Ser Arg Tyr Glu Lys Gly Leu Val Ala Glu Val Ser Glu
145                 150                 155                 160

Phe Leu Phe Gly Ser Gly Phe Ala Ile Ala Glu Gly Ala Leu Trp Thr
                165                 170                 175

Val Arg Arg Arg Ser Val Val Pro Ser Leu His Lys Arg Phe Leu Ser
            180                 185                 190

Val Met Val Asp Arg Val Phe Cys Lys Cys Ala Glu Arg Leu Val Glu
        195                 200                 205

Lys Leu Glu Thr Ser Ala Leu Ser Gly Lys Pro Val Asn Met Glu Ala
    210                 215                 220

Arg Phe Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn
225                 230                 235                 240
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Tyr Asn Phe Asp Ser Leu Thr Ser Asp Ser Pro Val Ile Asp Ala Val
245 250 255

Tyr Thr Ala Leu Lys Glu Ala Glu Leu Arg Ser Thr Asp Leu Leu Pro
260 265 270

Tyr Trp Lys Ile Asp Leu Leu Cys Lys Ile Val Pro Arg Gln Ile Lys
275 280 285

Ala Glu Lys Ala Val Asn Ile Ile Arg Asn Thr Val Glu Asp Leu Ile
290 295 300

Thr Lys Cys Lys Lys Ile Val Asp Ala Glu Asn Glu Gln Ile Glu Gly
305 310 315 320

Glu Glu Tyr Val Asn Glu Ala Asp Pro Ser Ile Leu Arg Phe Leu Leu
325 330 335

Ala Ser Arg Glu Glu Val Thr Ser Val Gln Leu Arg Asp Asp Leu Leu
340 345 350

Ser Met Leu Val Ala Gly His Glu Thr Thr Gly Ser Val Leu Thr Trp
355 360 365

Thr Ile Tyr Leu Leu Ser Lys Asp Pro Ala Ala Leu Arg Arg Ala Gln
370 375 380

Ala Glu Val Asp Arg Val Leu Gln Gly Arg Leu Pro Arg Tyr Glu Asp
385 390 395 400

Leu Lys Glu Leu Lys Tyr Leu Met Arg Cys Ile Asn Glu Ser Met Arg
405 410 415

Leu Tyr Pro His Pro Pro Val Leu Ile Arg Arg Ala Ile Val Asp Asp
420 425 430

Val Leu Pro Gly Asn Tyr Lys Ile Lys Ala Gly Gln Asp Ile Met Ile
435 440 445

Ser Val Tyr Asn Ile His Arg Ser Pro Glu Val Trp Asp Arg Ala Asp
450 455 460

Asp Phe Ile Pro Glu Arg Phe Asp Leu Glu Gly Pro Val Pro Asn Glu
465 470 475 480

Thr Asn Thr Glu Tyr Arg Phe Ile Pro Phe Ser Gly Gly Pro Arg Lys
485 490 495

Cys Val Gly Asp Gln Phe Ala Leu Leu Glu Ala Ile Val Ala Leu Ala
500 505 510

Val Val Leu Gln Lys Met Asp Phe Thr Ile Glu Leu Val Pro Asp Gln
515 520 525

Lys Ile Asn Met Thr Thr Gly Ala Thr Ile His Thr Thr Asn Gly Leu
530 535 540

Tyr Met Asn Val Val Asn Ile Gly Val Gln Val Asp Glu Ala Arg Lys
545 550 555 560

His Gly Tyr Asn Ser Phe Ile Val Tyr Gly Tyr Thr Leu Tyr Ala Tyr
565 570 575

Ile Ser Pro Arg Ile Trp Ser Ala Met Pro Val Leu
580 585

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<211> 1734
<212> DNA
<213> Arabidopsis thaliana

<400> 53
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cggagagctt ctgtttccat caagtgccaa tctacggagc caaagacgaa tggtaacata 180

ttggacaatg cgagcaacct tttgacaaat tttttaagtg gtggaagttt ggggtcaatg 240

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gactggttct tggagcatgg aggaatttat aaacttgcgt ttggtccaaa agcctttgtt 360

gtcatctcag atcccattat tgcaaggcat gtcctccggg aaaatgcttt ttcttatgac 420

aagggagttc ttgctgagat cttagagccg attatgggaa aagggttaat accggctgat 480

ctagatacgt ggaagttaag aagaagagct atcactcccg cattccataa attgtatcta 540

gaggccatgg tcaaagtatt tagtgactgt tcggagaaaa tgatattgaa atctgagaaa 600

ctcataaggg agaaagaaac ttcaagcggg gaggacacca ttgagttgga tctggaagca 660

gaattctcga gtctggctct tgatattata ggtcttagcg tgttcaacta cgattttggc 720

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catcggtcta ctttctactt cccttattgg aactttcctc cagctagatg gatagttccg 840

aggcaacgaa agttccaaag cgatctgaag attataaacg attgccttga tggcctcatt 900

caaaatgcta aagagacaag acagcaggaa acagatgttg agaagctcca ggaaagggac 960

tacactaatc tcaaggatgc aagtcttttg cggttcttag tcgatatgcg cggtgttgac 1020

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aaaaagctcg agtacatacg actgatcgtt gtagaagtcc ttcgtctctt tcctcagcca 1260

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aaggagagca atggaattga aggatgggct ggctttgatc catctcgtag ccccggggca 1500

ctatatccga atgagataat agcagacttt gcattcttac catttggtgg aggaccaaga 1560

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cagaaattcg atgtggagct gcgtggaacg ccagaatctg ttgaactcgt gagcggcgca 1680

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<210> 54
<211> 1926
<212> DNA
<213> Pisum sativum

<400> 54
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ctgcgagaaa atgcattttc ttatgacaag ggagtacttg ctgatatcct agaaccaatt 540

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gctccgggtt tccatacctc atacttggaa gctatggtac aactattcac ttcatgttca 660

gaaagaactg tgttaaaggt caatgagctt cttgaaggag aggggcgtga tggacagaag 720

tcagttgaat tggaccttga ggcagaattt tcaaatttgg ctcttgagat tattgggcta 780

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aagccaactt ttgaattgct taaaaagttg gagtacatta ggttaattgt tgtggagact 1320

cttcgattat atccacaacc acctctgctg attagacgtt cactcaaacc tgatgttttg 1380

ccaggtggac ataaaggtga caaagatggt tatacaattc ctgctgggac tgatgtcttc 1440

atttctgtat ataatctcca tcgatctcca tatttttggg accgccctaa tgacttcgag 1500

cctgaacgat ttctagtgca aaacaataat gaagaagttg aagggtgggc tggttttgac 1560

ccatctcgaa gtcctggagc cttgtatcca aacgagatta tatcagattt tgcattcttg 1620

ccttttggtg gtggaccacg aaaatgcgtt ggagaccaat ttgctctcat ggaatccact 1680

gtagcgctag tatgctgcta cagaatttcg atgtggaact gaaggggacc cctgaatcgg 1740

ttgaactagt tactggggca actatccata ccaaaaatgg attgtggtgc aatttgagga 1800

agagatctag tttacattga catgttaact gcaacatttt tcttatgcag aatgatgtac 1860

aaaatattta tcatttaaaa tgacattaac attgaatagt gtctaataca gctaaagggt 1920

atttac 1926

<210> 55
<211> 1731
<212> DNA
<213> Glycine max

<400> 55
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tcttcaatca gatgccaatc aattaatacc gataagaaga aatcaagtag aaatctgctg 180

ggcaatgcaa gtaacctcct cacggactta ttaagtggtg gaagtatagg gtctatgccc 240

atagctgaag gtgcagtctc agatctgctt ggtcgacctc tttttttctc actgtatgat 300

tggttcttgg agcatggtgc ggtgtataaa cttgcctttg gaccaaaagc atttgttgtt 360

gtatcagatc ccatagttgc tagacatatt ctgcgagaaa atgcattttc ttatgacaag 420

ggagtacttg ctgatatcct tgaaccaata atgggcaaag gactcatacc agcagacctt 480

gatacttgga agcaaaggag aagagtcatt gctccggctt tccataactc atacttggaa 540

gctatggtta aaatattcac aacttgttca gaaagaacaa tattgaagtt taataagctt 600

cttgaaggag agggttatga tggacctgac tcaattgaat tggatcttga ggcagagttt 660

tctagtttgg ctcttgatat tattgggctt ggtgtgttca actatgactt tggttctgtc 720

accaaagaat ctccagttat taaggcagtc tatggcactc tttttgaagc tgaacacaga 780

tccactttct acattccata ttggaaaatt ccattggcaa ggtggatagt cccaaggcaa 840

agaaagtttc aggatgacct aaaggtcatc aatacttgtc ttgatggact tatcagaaat 900

gcaaaagaga gcagacagga aacagatgtt gagaaattgc agcagaggga ttacttaaat 960

ttgaaggatg caagtcttct gcgtttcctg gttgatatgc ggggagctga tgttgatgat 1020

cgtcagttga gggatgattt aatgacaatg cttattgccg gtcatgaaac aacggctgca 1080

gttcttactt gggcagtttt cctcctagct caaaatccta gcaaaatgaa gaaggctcaa 1140

gcagaggtag atttggtgct gggtacgggg aggccaactt ttgaatcact taaggaattg 1200

cagtacatta gattgattgt tgtggaggct cttcgtttat acccccaacc acctttgctg 1260

attagacgtt cactcaaatc tgatgtttta ccaggtgggc acaaaggtga aaaagatggt 1320

tatgcaattc ctgctgggac tgatgtcttc atttctgtat ataatctcca tagatctcca 1380

tatttttggg accgccctga tgacttcgaa ccagagagat ttcttgtgca aaacaagaat 1440

gaagaaattg aaggatgggc tggtcttgat ccatctcgaa gtcccggagc cttgtatccg 1500

aacgaggtta tatcggattt tgcattctta ccttttggtg gcggaccacg aaaatgtgtt 1560

ggggaccaat ttgctctgat ggagtccact gtagcgttga ctatgctgct ccagaatttt 1620

gacgtggaac taaaagggac ccctgaatcg gtggaactag ttactggggc aactattcat 1680

accaaaaatg gaatgtggtg cagattgaag aagagatcta atttacgttg a 1731

<210> 56
<211> 659
<212> PRT
<213> Skeletonema costatum

<400> 56

Met Ala Ser Tyr Glu Ser Asp Leu Leu Ser Thr Trp Asp Glu Asp Pro
1 5 10 15

Ser Leu Gln Lys Gly Phe Asp Trp Glu Ile Glu Lys Leu Arg Arg Tyr
20 25 30

Phe Ala Gly Leu Arg Gln Thr Pro Asp Gly Arg Trp Val Arg Lys Ser
35 40 45

Thr Leu Phe Glu Phe Leu Val Thr Asn Ser Pro Ser Lys Val Val Gly
50 55 60

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Val Gly Pro Asp Gly Glu Arg Tyr Glu Ser Pro Pro Lys Pro Val Asn
65                  70                  75                  80

Ile Phe Asp Val Gly Val Leu Val Gly Lys Asn Thr Leu Thr Trp Leu
                85                  90                  95

Gly Phe Gly Pro Asn Leu Gly Met Ala Ala Val Pro Asp Ala Val Ile
            100                 105                 110

Gln Lys Tyr Glu Gly Ser Phe Phe Thr Phe Ile Lys Gly Ala Leu Gly
        115                 120                 125

Gly Asp Leu Gln Thr Leu Ala Gly Gly Pro Leu Phe Leu Leu Leu Ala
    130                 135                 140

Lys Tyr Tyr Thr Asp His Gly Pro Ile Phe Asn Leu Ser Phe Gly Pro
145                 150                 155                 160

Lys Ser Phe Leu Val Ile Ser Asp Pro Val Met Ala Arg His Ile Leu
                165                 170                 175

Arg Asp Ser Ser Pro Glu Gln Tyr Cys Lys Gly Met Leu Ala Glu Ile
            180                 185                 190

Leu Glu Pro Ile Met Gly Asp Gly Leu Ile Pro Ala Asp Pro Lys Ile
        195                 200                 205

Trp Lys Val Arg Arg Arg Ala Val Val Pro Gly Phe His Lys Lys Trp
    210                 215                 220

Leu Asn Ser Met Ile Gly Leu Phe Gly Asp Cys Gly Asp Arg Leu Val
225                 230                 235                 240

Asp Asp Leu Glu Lys Arg Ser Thr Ser Asp Lys Pro Val Ile Asp Met
                245                 250                 255

Glu Glu Arg Phe Cys Ser Val Thr Leu Asp Ile Ile Gly Lys Ala Val
            260                 265                 270

Phe Asn Tyr Asp Phe Gly Ser Val Thr Lys Glu Ser Pro Ile Val Lys
        275                 280                 285

Ala Val Tyr Arg Val Leu Arg Glu Ala Glu His Arg Ser Ser Ser Phe
    290                 295                 300

Ile Pro Tyr Trp Asn Leu Pro Tyr Ala Glu Lys Trp Met Val Gly Gln
305                 310                 315                 320
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Val Glu Phe Arg Lys Asp Met Gly Met Leu Asp Asp Ile Leu Ala Lys
325 330 335

Leu Ile Asn Arg Ala Val Glu Thr Arg Gln Glu Ala Thr Val Glu Glu
340 345 350

Leu Glu Glu Arg Glu Thr Ser Asp Asp Pro Ser Leu Leu Arg Phe Leu
355 360 365

Val Asp Met Arg Gly Glu Asp Leu Thr Ser Lys Val Leu Arg Asp Asp
370 375 380

Leu Met Thr Met Leu Ile Ala Gly His Glu Thr Thr Ala Ala Met Leu
385 390 395 400

Thr Trp Thr Met Phe Gly Leu Val Ser Asn Asp Pro Gly Met Met Lys
405 410 415

Glu Ile Gln Ala Glu Val Arg Thr Val Met Gly Asn Lys Ser Arg Pro
420 425 430

Asp Tyr Asp Asp Val Val Ala Met Lys Lys Leu Arg Tyr Ala Leu Ile
435 440 445

Glu Ala Leu Arg Leu Tyr Pro Glu Pro Pro Val Leu Ile Arg Arg Ala
450 455 460

Arg Gln Glu Asp Thr Leu Pro Pro Gly Gly Thr Gly Leu Ser Gly Gly
465 470 475 480

Val Lys Val Leu Arg Gly Thr Asp Ile Phe Ile Ser Thr Trp Asn Leu
485 490 495

His Arg Ala Pro Glu Tyr Trp Glu Asn Ala Asp Lys Tyr Asp Pro Thr
500 505 510

Arg Trp Glu Arg Pro Phe Lys Asn Pro Gly Val Lys Gly Trp Asn Gly
515 520 525

Tyr Asp Pro Glu Lys Gln Ser Ser Gln Ser Leu Tyr Pro Asn Glu Ile
530 535 540

Thr Ser Asp Tyr Ala Phe Leu Pro Phe Gly Ala Gly Lys Arg Lys Cys
545 550 555 560

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Ile Gly Asp Gln Phe Ala Met Leu Glu Ala Ser Val Thr Leu Ser Met
                565                 570                 575

Ile Met Asn Lys Phe Asp Phe Thr Leu Val Gly Thr Pro Glu Asp Val
            580                 585                 590

Gly Met Lys Thr Gly Ala Thr Ile His Thr Met Asn Gly Leu Asn Met
        595                 600                 605

Met Val Ser Pro Arg Ser Glu Thr Asn Pro Ile Pro Gly Thr Asn Glu
    610                 615                 620

Trp Trp Thr Lys Gln His Leu Met Arg Gly Leu Ser Ser Thr Gly Arg
625                 630                 635                 640

Pro Tyr Thr Ser Asp Glu Asp Ala Ala Trp Thr Thr Ser Ala Asn Gly
                645                 650                 655

Met Arg Pro
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<210> 57
<211> 1980
<212> DNA
<213> Skeletonema costatum

<400> 57

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gacgggcgat gggtgcgcaa gtcgacactg tttgagtttc ttgtgacaaa ctctccaagt    180

aaagtagttg gggtaggtcc ggatggggaa cggtatgaaa gccctccgaa accagtcaat    240

atcttcgatg tgggagtgtt agtcggtaag aatacactca cttggttggg atttggaccg    300

aatttgggta tggccgcggt acccgatgca gtcattcaaa agtatgaggg tagcttcttc    360

acctttatca agggagcatt ggggggtgat ttgcaaactt tggcgggtgg tcctttgttc    420

ttattgcttg ccaagtatta tacggatcat ggacccattt tcaacttgag ttttggacca    480

aagagctttt tggtgatttc ggatcctgtt atggcgaggc atattttgag ggatagttca    540

ccggagcagt attgtaaggg aatgcttgcg gagattttgg aaccgatcat gggtgatgga    600

ttgattcctg cagatccaaa gatttggaag gttcgtcgaa gagctgtcgt acctggtttc    660

cacaaaaagt ggctgaacag catgattggt ttgttcggag actgtggtga tcgtctcgtt    720

gacgatctag aaaagcgttc tacttcagat aaacctgtaa ttgacatgga agaacgattc    780

tgttccgtca cactcgatat catcggtaag gcagtattca actatgattt tggatcagtg    840
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gttgaattcc gcaaagatat gggaatgctt gacgatatct tggcaaaact gatcaatcgt 1020

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gatccgagtc tcttaaggtt cctagttgat atgaggggag aagatttaac gagtaaagtg 1140

ttgagagatg atttgatgac aatgcttatt gcaggacatg aaacaacagc ggcaatgctg 1200

acgtggacaa tgtttgggct agtaagcaac gatcctggca tgatgaagga aatccaggca 1260

gaagttcgaa ctgtcatggg caataagtct cgaccagatt acgatgatgt tgtggcgatg 1320

aaaaagttga ggtatgcttt gattgaagca cttcgattat atcccgagcc acccgtgttg 1380

attcgcaggg caaggcaaga ggacactctt ccaccaggtg gtacgggtct ttctggaggt 1440

gtcaaagtat tgcgtggaac agatatcttt atttctactt ggaaccttca ccgcgctcca 1500

gaatactggg agaatgcaga caaatatgac cctactcgat gggagcgtcc gttcaaaaac 1560

ccaggtgtta agggttggaa tggatatgat ccggaaaaac aatcatctca atcactttat 1620

cctaacgaga taacgtcaga ctatgctttc cttccttttg gtgctgggaa gagaaaatgt 1680

atcggggatc agtttgctat gctcgaggct tcggttacac tatcgatgat tatgaataaa 1740

tttgacttca cgttggtcgg taccctgaa gatgtcggca tgaagaccgg agcaactatt 1800

cataccatga atgggctcaa catgatggtc agccctcgat cagagacaaa cccgattcca 1860

gggacaaatg agtggtggac gaaacaacat ctaatgagag gtttgagttc tactggaaga 1920

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<210> 58

<400> 58
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<210> 59
<211> 18
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 59
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<210> 60
<211> 77
<212> PRT
<213> Oryza sativa

<400> 60

Leu Glu Thr Ser Ala Leu Ser Gly Lys Pro Val Asn Met Glu Ala Arg
1 5 10 15

Phe Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr
20 25 30

Asn Phe Asp Ser Leu Thr Ser Asp Ser Pro Val Ile Asp Ala Val Tyr
35 40 45

Thr Ala Leu Lys Glu Ala Glu Leu Arg Ser Thr Asp Leu Leu Pro Tyr
50 55 60

Trp Lys Ile Asp Leu Leu Cys Lys Ile Val Pro Arg Gln
65 70 75

<210> 61
<211> 77
<212> PRT
<213> Zea mays

<400> 61

Leu Glu Pro Tyr Ala Leu Ser Gly Glu Pro Val Asn Met Glu Ala Arg
1 5 10 15

Phe Ser Gln Leu Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr
20 25 30

Asn Phe Asp Ser Leu Thr Thr Asp Ser Pro Val Ile Asp Ala Val Tyr
35 40 45

Thr Ala Leu Lys Glu Ala Glu Leu Arg Ser Thr Asp Leu Leu Pro Tyr
50 55 60

Trp Lys Val Gly Phe Leu Cys Lys Ile Ile Pro Arg Gln
65 70 75

<210> 62
<211> 77
<212> PRT
<213> Hordeum vulgare

<400> 62

Leu Glu Thr Tyr Ala Leu Ser Gly Glu Pro Val Asn Met Glu Ala Arg
1 5 10 15

Phe Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr
20 25 30

Asn Phe Asp Ser Leu Thr Ser Asp Ser Pro Val Ile Asp Ala Val Tyr
35 40 45

Thr Ala Leu Lys Glu Ala Glu Ala Arg Ser Thr Asp Leu Leu Pro Tyr
50 55 60

Trp Gln Ile Asp Leu Leu Cys Lys Ile Val Pro Arg Gln
65 70 75

<210> 63
<211> 77
<212> PRT
<213> Triticum aestivum

<400> 63

Leu Glu Thr Tyr Ala Leu Ser Gly Glu Pro Val Asn Met Glu Ala Arg
1 5 10 15

Phe Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr
20 25 30

Asn Phe Asp Ser Leu Thr Ser Asp Ser Pro Val Ile Asp Ala Val Tyr
35 40 45

Thr Ala Leu Lys Glu Ala Glu Ala Arg Ser Thr Asp Leu Leu Pro Tyr
50 55 60

Trp Gln Ile Asp Leu Leu Cys Lys Ile Val Pro Arg Gln
65 70 75

<210> 64
<211> 77
<212> PRT
<213> Arabidopsis thaliana

<400> 64

Leu Gln Pro Tyr Ala Glu Asp Gly Ser Ala Val Asn Met Glu Ala Lys
1 5 10 15

Phe Ser Gln Met Thr Leu Asp Val Ile Gly Leu Ser Leu Phe Asn Tyr
20 25 30

Asn Phe Asp Ser Leu Thr Thr Asp Ser Pro Val Ile Glu Ala Val Tyr
35 40 45

Thr Ala Leu Lys Glu Ala Glu Leu Arg Ser Thr Asp Leu Leu Pro Tyr
50 55 60

Trp Lys Ile Asp Ala Leu Cys Lys Ile Val Pro Arg Gln
65 70 75

<210> 65
<211> 77
<212> PRT
<213> Helianthus annuus

<400> 65

Leu Arg Ser Tyr Ala Arg Ser Asp Thr Ser Val Asn Met Glu Gln Gln
1 5 10 15

Phe Ser Gln Leu Thr Leu Asp Val Ile Gly Leu Ala Val Phe Asn Tyr
20 25 30

Asn Phe Asp Ser Leu Thr Ala Asp Ser Pro Val Ile Glu Ser Val Tyr
35 40 45

Thr Ala Leu Lys Glu Ala Glu Ala Arg Ser Thr Asp Leu Leu Pro Tyr
50 55 60

Trp Lys Ile Ser Ala Leu Cys Lys Ile Ile Pro Arg Gln
65 70 75

<210> 66
<211> 77
<212> PRT
<213> Lycopersicon esculentum

<400> 66

Leu Leu Pro Asp Ala Ile Ser Gly Ser Ala Val Asn Met Glu Ala Lys
1 5 10 15

Phe Ser Gln Leu Thr Leu Asp Val Ile Gly Leu Ala Leu Phe Asn Tyr
20 25 30

Asn Phe Asp Ser Leu Thr Thr Asp Ser Pro Val Ile Asp Ala Val Tyr
35 40 45

Thr Ala Leu Lys Glu Ala Glu Leu Arg Ser Thr Asp Leu Leu Pro Tyr
50 55 60

Trp Gln Ile Lys Ala Leu Cys Lys Phe Ile Pro Arg Gln
65 70 75

<210> 67
<211> 77
<212> PRT
<213> Hordeum vulgare

<400> 67

Leu Asp Lys Ala Ala Ser Asp Gly Glu Asp Val Glu Met Glu Ser Leu
1 5 10 15

Phe Ser Arg Leu Thr Leu Asp Val Ile Gly Lys Ala Val Phe Asn Tyr
20 25 30

Asp Phe Asp Ser Leu Ser Tyr Asp Asn Gly Ile Val Glu Ala Val Tyr
35 40 45

Val Thr Leu Arg Glu Ala Glu Met Arg Ser Thr Ser Pro Ile Pro Thr
50 55 60

Trp Glu Ile Pro Ile Trp Lys Asp Ile Ser Pro Arg Gln
65 70 75

<210> 68
<211> 77
<212> PRT
<213> Triticum aestivum

<400> 68

Leu Asp Lys Ala Ala Ser Asp Gly Glu Asp Val Glu Met Glu Ser Leu
1 5 10 15

Phe Ser Arg Leu Thr Leu Asp Val Ile Gly Lys Ala Val Phe Asn Tyr
20 25 30

Asp Phe Asp Ser Leu Ser Tyr Asp Asn Gly Ile Val Glu Ala Val Tyr
35 40 45

Val Thr Leu Arg Glu Ala Glu Met Arg Ser Thr Ser Pro Ile Pro Thr
50 55 60

Trp Glu Ile Pro Ile Trp Lys Asp Ile Ser Pro Arg Gln
65 70 75

<210> 69
<211> 77
<212> PRT
<213> Oryza sativa

<400> 69

Leu Asp Lys Ala Ala Thr Asp Gly Glu Asp Val Glu Met Glu Ser Leu
1 5 10 15

Phe Ser Arg Leu Thr Leu Asp Val Ile Gly Lys Ala Val Phe Asn Tyr
20 25 30

Asp Phe Asp Ser Leu Ser Tyr Asp Asn Gly Ile Val Glu Ala Val Tyr
35 40 45

Val Thr Leu Arg Glu Ala Glu Met Arg Ser Thr Ser Pro Ile Pro Thr
50 55 60

Trp Glu Ile Pro Ile Trp Lys Asp Ile Ser Pro Arg Gln
65 70 75

<210> 70
<211> 77
<212> PRT
<213> Glycine max

<400> 70

Leu Asp Ala Ala Ala Ser Asp Gly Glu Asp Val Glu Met Glu Ser Leu
1 5 10 15

Phe Ser Arg Leu Thr Leu Asp Ile Ile Gly Lys Ala Val Phe Asn Tyr
20 25 30

Asp Phe Asp Ser Leu Ser Asn Asp Thr Gly Ile Val Glu Ala Val Tyr
35 40 45

Thr Val Leu Arg Glu Ala Glu Asp Arg Ser Val Ala Pro Ile Pro Val
50 55 60

Trp Glu Ile Pro Ile Trp Lys Asp Ile Ser Pro Arg Leu
65 70 75

<210> 71
<211> 77
<212> PRT
<213> Lycopersicon esculentum

<400> 71

Leu Asp Val Ala Ala Thr Asp Gly Glu Asp Val Glu Met Glu Ser Leu
1 5 10 15

Phe Ser Arg Leu Thr Leu Asp Ile Ile Gly Lys Ala Val Phe Asn Tyr
20 25 30

Asp Phe Asp Ser Leu Thr Val Asp Thr Gly Ile Val Glu Ala Val Tyr
35 40 45

Thr Val Leu Arg Glu Ala Glu Asp Arg Ser Val Ala Pro Ile Pro Val
50 55 60

Trp Glu Leu Pro Ile Trp Lys Asp Ile Ser Pro Lys Leu
65 70 75

<210> 72
<211> 77
<212> PRT
<213> Arabidopsis thaliana

<400> 72

Leu Asp Ala Ala Ala Leu Lys Gly Glu Glu Val Glu Met Glu Ser Leu
1 5 10 15

Phe Ser Arg Leu Thr Leu Asp Ile Ile Gly Lys Ala Val Phe Asn Tyr
20 25 30

Asp Phe Asp Ser Leu Thr Asn Asp Thr Gly Val Ile Glu Ala Val Tyr
35 40 45

Thr Val Leu Arg Glu Ala Glu Asp Arg Ser Val Ser Pro Ile Pro Val
50 55 60

Trp Asp Ile Pro Ile Trp Lys Asp Ile Ser Pro Arg Gln
65 70 75

<210> 73
<211> 77
<212> PRT
<213> Chlamydomonas reinhardtii

<400> 73

Leu Asp Lys Tyr Ala Ala Ser Gly Thr Ser Leu Asp Met Glu Asn Phe
1 5 10 15

Phe Ser Arg Leu Gly Leu Asp Ile Ile Gly Lys Ala Val Phe Asn Tyr
20 25 30

Asp Phe Asp Ser Leu Ala His Asp Asp Pro Val Ile Gln Ala Val Tyr
35 40 45

Thr Leu Leu Arg Glu Ala Glu His Arg Ser Thr Ala Pro Ile Ala Tyr
50 55 60

Trp Asn Ile Pro Gly Ile Gln Phe Val Val Pro Arg Gln
65 70 75

<210> 74
<211> 85
<212> PRT
<213> Arabidopsis thaliana

<400> 74

Glu Lys Leu Ile Arg Glu Lys Glu Thr Ser Ser Gly Glu Asp Thr Ile
1 5 10 15

Glu Leu Asp Leu Glu Ala Glu Phe Ser Ser Leu Ala Leu Asp Ile Ile
20 25 30

Gly Leu Ser Val Phe Asn Tyr Asp Phe Gly Ser Val Thr Lys Glu Ser
35 40 45

Pro Val Ile Lys Ala Val Tyr Gly Thr Leu Phe Glu Ala Glu His Arg
50 55 60

Ser Thr Phe Tyr Phe Pro Tyr Trp Asn Phe Pro Pro Ala Arg Trp Ile
65 70 75 80

Val Pro Arg Gln Arg
85